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THE TWO SYLVIUSES.
AN HISTORICAL STUDY.

By Frank Baker, M. D., Ph. D.,
Professor of Anatomy, Georgetown University, Washington, D. C.

I. Jacobus Sylvius.

In the history of anatomy certain figures stand out in a light that tends to confuse the vision of surrounding objects and give a false impression of contemporary characters. The principal one of these figures is Vesalius. The dramatic history of his life as related by himself is well known; how, when he was a pupil in Paris, under Sylvius, he corrected the work of his master, and how, after he published his great "Fabrica," which reformed anatomy and divorced it from barren scholasticism, he was violently attacked by Sylvius, because he had dared to correct obvious errors of Galen. This controversy, by bringing Sylvius into somewhat unpleasant notoriety, has influenced to a considerable extent our judgment of him, and has even caused a distortion of certain facts regarding his work and discoveries.

If we turn to the Century Dictionary of Proper Names we find:

"*Sylvius* (Jacques Dubois). Born at Amiens, France, 1478, died at Paris, 1555. A French anatomist, lecturer on anatomy at Paris. He made various anatomical discoveries, and invented injection. From him the Sylvian aqueduct, the Sylvian artery, and the Sylvian fissure (of the brain) were named."

Similar statements are found in many authoritative works.[1]

Sir Michael Foster, in his excellent "Lectures on the History of Physiology," says, p. 5:

"We daily, in the present time, name him [Jacobus Sylvius] when we speak of the fissure of Sylvius."

Sir Benjamin Ward Richardson, in his "Disciples of Æsculapius," Vol. I, p. 79, says, speaking of the anatomists contemporary with Vesalius:

"They were conspicuous for the close attention they paid to particular parts, Sylvius to the brain, ... ; and from the special studies in these particular directions they connected their names so intimately with the parts they dissected and described, that their names have become, like the parts themselves, one and the same in literature: . . . . as the fissure of Sylvius."

And also, p. 77:

"He [Vesalius] was studying human anatomy under Sylvius, at that time the light of his age, and still a light, through his researches on the brain, by which he is ever identified."

A compilation of the authorities mentioned shows that it is the widely accepted opinion that Jacobus Sylvius made discoveries in the anatomy of the brain, that we especially owe to him the fissure, artery and aqueduct of Sylvius; that, besides

[1] A hasty search has produced the following list, which doubtless might be considerably extended: Baas, Outlines of the History of Medicine, 1889; Foster's Medical Encyclopedia and Dictionary, 1894; Johnson's Universal Encyclopedia, 1895; The Sydenham Society's Lexicon of Medicine and Allied Subjects, 1899; Gould's Illustrated Dictionary of Medicine, 1903; The New International Encyclopedia, 1904; Kemper, The World's Anatomists, 1905; Dorland's Illustrated Dictionary of Medicine, 1906; Nelson's Encyclopedia, 1907; Meyer's Konversations-Lexikon, 1908; Brockhaus' Konversations-Lexikon, 1908; Locy, W. A., Biology and its Makers, 1908.

these, there have at times been named as his discoveries, or in his honor, the Sylvian ventricle (fifth ventricle), the Sylvian valve (Eustachian valve of the heart), and the *caro quadrata Sylvii* (flexor accessorius muscle of the foot); also that he invented injection of vessels for purposes of anatomical demonstration.

It would seem that these eminent authorities ought to have questioned such statements as these in view of the well-known fact that the physiology of the brain was totally misunderstood until long after that period and that no great amount of attention was given to its structure by any anatomist until the science was much farther developed. Knowing that Vesalius, the pupil and prosector of Sylvius, was ignorant of most of these matters, it seemed to me strange that Sylvius should know of them, and some years ago I satisfied myself that the statements so generally current are wholly or partially wrong and recently I have examined the works of Jacobus Sylvius and other authors in order to determine where credit should properly be given. I have found that the modern world, while exalting the discoveries of this man beyond what they deserve, has also done scant justice to his real merits, and for this reason I have prepared a brief account of what he really did and did not do.

First, let us see what foundation there is for the generally accepted statements.

No mention of the fissure of Sylvius occurs in the works of Jacobus Sylvius nor in those of any previous or contemporary author. No particular mention is made of the Sylvian artery (middle cerebral artery). While he describes a passage from the third to the fourth ventricle, this was mentioned previously by Galen, Oribasius, Berengarius and Vesalius. He nowhere calls it an aqueduct, and there is some slight doubt whether the passage he mentions is really what we now call the aqueduct of Sylvius. He probably never saw the fifth ventricle; though, like Vesalius before him, he describes the septum lucidum in an imperfect manner. He does describe a fold on the wall of the heart at the entrance of the inferior vena cava, so that we may not improperly assign to him, instead of to Eustachius, the discovery of the Eustachian valve. He describes a "*moles carnea*," not a *caro quadrata*, as existing on the sole of the foot, in the situation of the flexor accessorius, but in this he only followed Oribasius, who mentions the muscles attached to the long flexor of the toes. As to the injection of vessels it would seem that his merit is not great. He says:

"You may effectually ascertain the distribution of vessels by blowing through tubes, which I approve rather than endeavoring to supply the place of the blood by means of a liquid tinged with saffron, wine or otherwise colored. For when these liquids flow out they confuse the dissection by their color."[2]

There was no effective use made of liquid injections until long after the day of Sylvius. It may be mentioned also that if the mere fact of injection is to be considered, the honor belongs to Berengarius, for he mentions in his Commentary on Mundinus, published thirty-four years before Sylvius's anatomical works, that he had injected the renal veins.[3]

We see by this that the accepted reports as to the discoveries of Jacobus Sylvius have but little foundation in fact. Let us see now something about the man himself, and find out what he really did.

Jacques Dubois was born at a little village called Louvilly, near Amiens, so that when he became a scholar and had, after the fashion of the time, to assume a Latin cognomen, he called himself Jacobus Sylvius Ambianus, as Andrew Wesel from Brussels called himself Andreas Vesalius Bruxellensis. His father was a weaver, the family was poor, there were fifteen children, eleven boys and four girls. Jacques was the seventh child. An older brother, François, became the principal of the college of Tournay, near Paris, and was able to secure the admission of his brother to that institution. Here Jacques showed extraordinary zeal for the study of languages, and mastered thoroughly Latin, Greek and Hebrew. A French grammar composed by him was long a classic, and he was the author of a poem celebrating the meeting of Henry VIII and Francis I on the Field of the Cloth of Gold. He also excelled in mathematics and invented machines for transportation by water. He soon, however, became interested in the structure of the human body, being led to it from a careful perusal of the works of Hippocrates and Galen. He appears from passages in his works to have used every opportunity that chance threw in his way for examining bodies: a mason killed by a fall from a roof, a woman dying in childbed, etc. He was equally active in the study of pharmacy, visiting the shops of apothecaries, and even traveling to distant cities to learn of pharmaceutical methods. He was unable, through poverty, to defray the considerable expense of obtaining a degree, but his erudition in medical matters was so well known that there gathered about him a considerable number of pupils, and he was so successful that the Faculty of Medicine at Paris forbade him to teach, as it interfered with the regular schools. He, therefore, betook himself to Montpellier, the celebrated university in the south of France, and after taking a course there which undoubtedly included the dissection of human bodies, he obtained a bachelor's degree, June 28, 1531. He returned to Paris; reopened, at the college of Treguier, his classes which soon became famous and were thronged with students, the number sometimes reaching 400 or 500. It was here that came Vesalius, Servetus, Stephanus, Gesnerus, Vulpinus and others famous in the annals of anatomy. To assist his students he formed a library, a cabinet of osteology and another of materia medica.

Moreau says:[4] "In order that he might attend more conveniently and carefully to his duties he selected a house among the surgeons, to whom *from olden times* [ab omni patrum memoria] four of the Parisian physicians appointed by the

[2] Jacobi Sylvii Opera Medica, p. 128.

[3] Commentaria in Mundinum, p. clxxviii, b. 1521.

[4] Jacobi Sylvii Vita, p. ii, b. Prefixed to Opera Medica Jacobi Sylvii. 1635.

Faculty for that purpose were accustomed to teach the art of dissecting upon at least four human bodies during each year."

His system appears to have been an eminently practical one. He had learned by experience the value of dissection, and in his little Introduction to Anatomy, he says:[5]

"I would have you look carefully and recognize by eye when you are attending dissections or when you see anyone else who may be better supplied with instruments than yourself. For my judgment is that it is much better that you should learn the manner of cutting by eye and touch than by reading and listening. For reading alone never taught anyone how to sail a ship, to lead an army, nor to compound a medicine, which is done rather by the use of one's own sight and the training of one's own hands."

* * * * * * * * * * *

"You would do well to dissect the bodies of those who have died of some disease in order that, by recognizing the cause of the malady, you may treat others wisely. Do not dissect only the bodies of men, but also those of monkeys and other animals similar in many respects to man. Yet I will recommend that at first you should work only upon human bodies, thus you will obtain a profound knowledge of the different parts of man which you can apply in dissecting other animals."

* * * * * * * * * * *

"Now many do not like at first to view the dissection of man and cannot endure it without great disturbance of mind. Notwithstanding this, they ought, if they can, to accustom themselves from the very beginning to look diligently at the body of man while it is being dissected, and then to perform the dissection with their own hands. For this simple manner of learning is the shortest, most certain and easiest to retain."[6]

Similar practical ideas were developed by him concerning materia medica, in the teaching of which he was equally famous. In a suburb of Paris he had a house with a garden in which he grew medicinal plants, both indigenous and foreign, in order that he might teach his classes by inspection and observation in the shortest and easiest way. This was, you will remember, quite anterior to the establishment of botanic gardens.

In the excellent article on the history of anatomy in the ninth edition of the Encyclopedia Britannica, Sir William Turner has been very unjust to this hard-working and useful man, misled, doubtless, by the captious remarks made by Vesalius in the dedicatory epistle to the Emperor Charles V, prefixed to the Fabrica. He says that Sylvius betook himself to medicine from inordinate love of money, certainly a novel incentive for entering a profession whose members have usually been notoriously ill rewarded by the world's goods. Also that he acquired his medical degree "at the ripe age of fifty-one." No mention is made of the fact that he had been studying and teaching for many years previously. Further, that "a human body was never seen in his theatre," which certainly is contradicted, not only by the general tenor of Sylvius's works, but by the general reputation given him by his contemporaries. Vesalius was in the habit of making derogatory remarks about his preceptors that do not bear close scrutiny. It is incredible that he should have staid with Sylvius for three years if he had had no opportunity to learn anything while with him. The generally received opinion, that Vesalius sprang like Minerva from the head of Jove, armed cap-a-pie, and broke the record of all previous ages by dissecting the human body for the first time, does not bear critical examination. Without wishing to detract in any way from his well-merited fame, it seems quite certain that he must have been indebted to his master for a good deal, and that the foundations of the Fabrica were laid in Sylvius's laboratory.[7]

It is well established that the anatomical writers of that

[5] Opera Medica, p. 127.

[6] Loc. cit.

[7] It is not generally understood that dissection of the human body, as then practiced, was by no means uncommon in the pre-Vesalian epoch. As early as 1240 the Emperor Frederick II issued an order that a cadaver should be dissected before assembled physicians and surgeons once every five years. He also exhorted the students at the university of Salerno to give special attention to anatomy, and ordered that no surgeon should practice until he had given proof that he had studied anatomy for a year.

At Bologna dissection appears to have been practiced quite early, for in 1302 we find a medico-legal autopsy ordered by a judge, and in 1319 grave-robbing had to be legally suppressed. In 1341 Gentilis records the finding of gall-stones in a cadaver. In 1366 the university of Montpellier decreed an annual dissection, and in 1368 Venice did the same. In 1388 Florence passed a decree allowing bodies to be delivered for dissection. In 1391 King John of Aragon directed that bodies of criminals be delivered to the university of Lerida for dissection. In 1404 a public demonstration of anatomy was held at Vienna. In 1405 an annual demonstration was decreed at Bologna. A male criminal was dissected at Padua in 1429 and a female in the following year. In 1446 an anatomical theatre was erected at Padua. The university of Bologna decreed in 1442 that a male and a female body should be dissected annually. Padua, Ferrara and Pisa did the same. In 1460 a demonstration was held at Prague, in 1478 at Paris, 1485 Tübingen, 1493 Paris again. In 1483 the Paris Faculty decreed that anatomical knowledge should be required of baccalaureates in medicine. I have already alluded to Moreau's statement that four dissections annually were expected there. In 1496 it was ordered that the remains from dissections be buried in consecrated ground. In 1495 statutes regulating dissection were passed at Vienna, and during the same year Michael Angelo was dissecting at Florence in the cloisters of Santo Spirito, the prior of the cloisters furnishing him with cadavers.

Many dissections must have occurred at Florence, as sketches by Pollajuolo, Verocchio, Leonardo, Donatello, Raphael, Bandinelli and others show that they were well acquainted with the anatomy of the muscular and osseous systems. Leonardo is said to have remarked in 1516 that he had dissected more than 100 subjects. As to his anatomical drawings, William Hunter says, "I expected to find in the drawings of Leonardo da Vinci at most only the anatomical indications indispensable for a painter in practicing his art; but to my great astonishment I discovered that Leonardo had studied anatomy as a whole and that very profoundly. When I consider the care with which he studied every part of the human body, I am persuaded that he ought to be considered the best and greatest anatomist of his epoch." These drawings all antedate Vesalius and quite recently it has been alleged that Vesalius must have plagiarized from them.

Pope Clement VII (1523-24) granted the practice of dissection at Rome as an aid to medical instruction. At Louvain, Vesalius's university, a dissection was performed in 1518. It could hardly have had any effect upon the great reformer of anatomy, as he was only four years old at the time. Records of dissections at Padua

period practiced the rude dissecting current at that time. There is no doubt but that Mundinus performed many dissections. He especially says that in 1315 he dissected two subjects. Montagnana, at Padua, speaks in 1444 of fourteen dissections at which he had assisted. Massa, at Venice, states that between 1524 and 1536 he performed nine; Benedetti, that he, himself, used bodies; Berengarius, that he dissected more than 100 cadavers, examining more than 100 heads to settle the vexed question of the *rete mirabile*. He says that he has before him the parts which he describes. Stephanus says that anatomy cannot properly be learned except upon the human cadaver, and his works show that he must have dissected. It is eminently so also with the works of Sylvius. Again and again we see that he must have carefully traced out the muscles, arteries and nerves that he describes.

Sylvius had a prejudice against anatomical drawings based upon his experience with crude, inartistic representations. He especially inveighs against the pictures of Berengarius.

FIG. 1.—A Dissection as Understood in the Fifteenth Century. From Melerstat's edition of the Anatomy of Mundinus, 1493.

FIG. 2.—Muscles of the Abdomen as Shown in Early Illustrations. From the Anatomia of Berengarius Carpensis, 1535.

"They can," he says, "at best, only serve to gratify the eyes of silly women [mulierculis oculos pasturis], to the true physician they must always be a hindrance, for it is his duty to view and handle the body as a whole and in all its parts, becoming acquainted with the substance, size, number, shape situation and connections of each as far as the fingers can reach, not confining this examination to the surface, the only portion that can be represented in pictures."[8]

Sylvius's methods, as shown by his works, were simple, elementary and eminently clear. He followed Galen blindly, it is true, but he simplified and reduced to the common understanding the garrulous and sometimes obscure text of his favorite author. In some respects he improves upon Galen and even upon his brilliant pupil, Vesalius. The writers of antiquity were not strong in myology. Galen says that the muscles are so numerous that they cannot well be described, since they often unite so as to seem to form but a single organ, but yet when they divide there seem to be as many organs as there are tendons. He named the platysma, the deltoid, the diaphragm, the intercostal and abdominal muscles, but designated the others of which he speaks by number, as the third muscle of the arm, the fifth muscle of the leg, etc. His nomenclature was followed by other authors, including Vesalius and Fallopius, but Sylvius, with an instinct for clarity of expression characteristic of a Frenchman, gave them separate names, most of which are retained in our nomenclature to-day. He says:

"Since it is difficult to remember the muscles if they are distinguished merely by number, as first, second, third, etc., we have thought best to apply to them special names in order to be more clear, and that they may be better retained in the memory, sometimes taking such names from the parts to which they are attached, such as the brachialis, the tibialis, the peroneus; at others from their shape, as the scaleni, the rhomboidei, the serrati, the lumbricoides, the soleus; again from their size, as magnus, parvus, longus, brevis; or from their substance, as carnosus, membranosus; or from the number of their heads, as biceps, triceps."[9]

He also applied a similar system to the vessels which Galen had not named, and we owe to him the names of jugular, subclavian, phrenic, axillary, renal, spermatic, pudic, femoral, popliteal, gastro-epiploic, superior and inferior mesenteric, and many other vessels. He did not name the nerves in this way, and it is probably owing to this that to-day we quite generally designate them by number instead of by their special characteristics.

This reform in nomenclature was greatly praised by the authors who immediately succeeded Vesalius. Riolanus, celebrated as the opponent of Harvey, who rarely speaks well of anyone, says (Œuvres Anatomiques, Paris, 1629):

"Jacobus Sylvius is the first who showed anatomy in the proper way, expending upon it an amount of labor and keen intelligence that are admirable. His Introduction to Anatomy, published after his death, is the work of a highly trained mind [un esprit fort poly] and would doubtless have been without an equal had it received the final touches from so distinguished a scholar. As it is there is more merit in this little book than in the big folio of Vesalius."

This is, of course, extravagant and unmerited praise, but it is given by a man who was at the very head of the anatomical teaching of his time, and whom Harvey addresses as the "prince of anatomists."

There was, undoubtedly, an unpleasant side to Sylvius's character. He had had a long struggle with poverty which made him narrow and avaricious, and he was probably not a very agreeable preceptor. We may, perhaps, dismiss as the idle gossip of students some of the tales that are told of him, such as his keeping his servants on bread and water,

exist for 1520, 1532, and the winter of 1536/7. Vesalius commenced his course there December 6, 1537.

For most of these data I am indebted to Puschmann's History of Medical Education, Roth's Life of Vesalius and Duval's Anatomie des Maîtres, where the original authorities are cited. No doubt the actual number of dissections was considerably greater than is shown by these scattered and desultory records.

[8] Ordo et ordinis ratio in legendis Hippocratis et Galeni libris, Opera Medica, p. 5.

[9] Opera Medica, p. 101.

never affording a fire, and carrying a billet of wood up and down stairs to keep himself warm.

He is said to have been short of stature, but robust and square set (quadratus), wearing abundant hair and a rough beard. His manner was austere and rude, his voice, while flexible, was strong and inclined to be harsh, he was quick of intelligence, ready at repartee, of tenacious memory, of sound judgment.

Doubtless the young Vesalius, rich, belonging to a family favored at the Emperor's court, impatient of restraint and bubbling over with enthusiasm and novel ideas, was a good deal of a trial to the old man. Budding geniuses of that kind are usually thorns in the side of conservative elders. The story of the quarrel is about all the present generation remembers. Vesalius published his great book, a matter at that time of enormous expense. It was far superior to anything that had ever before appeared in the history of the world. Sylvius, probably deterred by the cost, had not published his. That this favorite of fortune should so easily leap into the seat that he thought he had a right to occupy undoubtedly rankled in the old man's mind. Yet it was not so much for himself that he took up his weapons—his favorite author, Galen, was attacked. Now Galen was a great man, one of the greatest in the history of medicine. We should not forget that we owe much to him and that he far surpassed Vesalius in scientific insight and physiological experimentation. The force of his intellect and scientific imagination was such that he easily dominated all physiological thought until long after the time of Vesalius, who was, himself, really a Galenist. With the opportunity for investigation that Vesalius had Galen would probably have discovered the circulation of the blood, but Vesalius was blind to this great generalization though he knew of the valves of the heart, of the impermeability of the septum, and had possibly discussed the pulmonary circulation with Servetus and the valves in the veins with Stephanus and Fallopius.

To Sylvius this attack on Galen was nothing less than impious. Still, at first, he used considerable moderation, he wrote to Vesalius, recognizing his talents, but suggesting that he was mistaken, and offering to continue his friendship if he would recall what he had said about Galen. This olive branch was not accepted. Vesalius replied sharply that he had told the truth when he said that Galen did not dissect the human body, and challenged the students of Sylvius, who had been rather active in their attacks, to a trial; saying that they would do well if they would use their scalpels for dissection instead of for sharpening pens to calumniate him.

Sylvius could still have prevailed if he could have kept his temper. Vesalius had made many mistakes which were afterwards pointed out by Eustachius, Fallopius and others. Had Sylvius frankly accepted the undoubted fact that Galen was not fully acquainted with the anatomy of man, and brought only reasonable arguments against the young Fleming, he would have probably held his own as the chief anatomist of the age. The truth is that the fame of Vesalius was seriously reducing Sylvius's classes, and this was more than the crabbed sexagenarian could stand. He wrote the famous libel known as the Refutation of the Calumnies of Vesanus (a bad pun on Vesalius) in which he brought forward the most fantastic arguments to show that Galen always described the structures of man, not those of apes. He lacked the quiet poise that is the final touch for a great scientific investigator; he could not, like Harvey, quietly wait for years for the conclusion of his experiments; he could not, like Darwin, say, "If my views are not correct I should be the last to wish them to prevail." He destroyed his position by his own passion, and the world remembers his avarice and his scolding rather than his real merits.

PROFESSOR REGI PARISIENSIS. IACOBVS SYLVIVS AMBIANVS MEDICVS ET
Natus an. 1478. denatus an. 1555. Ianuarii.
AD PICTOREM
Exprime narrantem facunda voce Galenum,
Tractantemque manu corpora; victus erit.

FIG. 3.—Portrait of Jacobus Sylvius. By Mich. Foulto.

The battle was never doubtful; Vesalius won, his work was adopted as a standard throughout Europe.

At seventy-seven years of age the grim visitor whom all must meet approaches our soured and melancholy old man. Even at the last he is jeered at by his pupils. In the delirium of his last agony he fancies that he must get up and go to his work. So he totters out of bed, draws on his boots and dies on a settle in front of the fire. This was the occasion of a skit entitled Sylvius Ocreatus or Sylvius-in-Boots (alluding to Puss-in-Boots) in which the old man is said to have put on his boots in order that he might cross the Styx without paying Charon his fee. Even where his last obsequies were held the students must have their cruel fun. One of them wrote this mock epitah in charcoal on the walls of the church:

> "Sylvius hic situs est, gratis qui nil dedit unquam,
> Mortuus, et gratis quod legis ista dolet."

"In this grave lies old Sylvius, during his day
He never gave aught without getting full pay;
And though dead as a herring, so nought could be worse,
He is vexed he can't charge you for reading this verse."

It would seem that the old man must have had some premonition that posterity might not properly value his work, for he says, at the end of his Introduction to Anatomy:

"In addition, O good and gentle readers who have undertaken the study of medicine and who now under my guidance and leading have entered upon the reading of the anatomical books of Hippocrates and Galen, show always that you are not ungrateful and that you have a just regard for what, for the love of you, I have done."

He had no wife to follow him to the grave, no family ties, no children to brighten his home and to love and cherish his memory. He was buried in the Cemetery of the Poor Scholars, and I think that if I had been in the funeral train when this poor scholar passed to the final peace, I should, in spite of the jeers of the students, considering what we owe to him, have placed a wreath upon his coffin. Many such tributes were afterward paid to his memory. Here is one, written by a certain Johannes Sambucus:

"Barbariem purgat, revocat meliora docendo,
Audit decrepitum concio multa senem:
Pharmaca correxit: nimirum tribuisse Galeno
Dum studet, errores detegit usque suos."

"Unto the barbarous throng he wisdom brought.
E'en in old age great crowds his teaching sought.
Our pharmacy he helped: by zeal for Galen led,
His master's faults he hid and showed his own instead."

II. Franciscus de le Boë Sylvius.

We have still to ascertain to whom we owe the fissure, ventricle and aqueduct of Sylvius.

As to the fissure there is no difficulty if we go back to the authors of the seventeenth and eighteenth centuries. Haller, writing in 1774, says in his Bibliotheca Anatomica, Vol. I, page 389:

"Franciscus Sylvius (de le Boë) described the fissure which bears the name of its discoverer."

Thomas Bartholin, in his Anatomy, says (I quote from the English translation published in London in 1668):

"The windings of the brain (which I first learnt of Franciscus Sylvius, a great anatomist) if you diligently examine the matter you shall find to descend a good depth and that the brain doth gape on each side, over and above that same middle division made by the Sickle, with a winding clift, which begins in the forepart, about the roots of the Eyes, whence according to the bones of the temples, it goes back above the root of the spinal marrow, and divides the upper part of the brain from the lower part."

This is practically a translation of a note found on p. 262 of the Institutiones Anatomicæ of Caspar Bartholinus, father of Thomas, published in 1641. This note is placed in brackets and signed F. S., which is explained as indicating Franciscus Sylvius. It appears to be the first mention in literature of the fissure and artery of Sylvius.[10]

A similar passage occurs in Franciscus Sylvius's Disputationes Medicarum, first published in 1663, pp. 43, 44.

"The whole surface of the cerebrum is everywhere quite deeply marked by gyri similar to the convolutions of the small intestines, and especially by a notable *fissure* or *hiatus*, beginning at the roots of the eyes [optic tracts], passing backwards along the temples above, not farther than the roots of the medulla [crura cerebri], and dividing the cerebrum on either hand into an upper, much larger part and a lower, smaller one; with gyri occurring the whole length and depth of the fissure. I may even say with the beginnings of lesser gyri at the very upper part of the root."

About the date of this publication mention of this fissure appears widely in literature, always evidently based upon this description."

The fifth ventricle (Sylvian ventricle, pseudo-ventricle, ventricle of the septum) was first described by Franciscus Sylvius in his Disputationes, as follows:

"To our surprise we chanced to observe last year that there is a *hiatus* where the corpus callosum begins to thin out into the septum pellucidum. Although the septum is very thin it is divided into two layers. This we demonstrated a number of times to spectators."

As to the aqueduct we shall have to go much farther afield to properly ascertain the rights of discovery.

It was generally supposed by the anatomists of the Vesalian epoch that Galen had described this passage. That author says in his treatise, De usu partium:

"As all the nerves of the body that are distributed to parts below the head are derived either from the cerebellum or the spinal cord, the ventricle of the cerebellum [fourth ventricle] must be of considerable size so as to receive the psychic pneuma elaborated in the anterior ventricles; there must therefore be a canal between those ventricles and it. The ventricle is indeed large and the canal which from the anterior ventricles ends in it is very large also. This canal gives the only communication between the cerebrum and the cerebellum. . . . . The cerebrum, being separated from the cerebellum by the fold of dura mater [tentorium], has to be attached to it at least in one point in order to form the above-mentioned canal, and its two ventricles end at the same point. . . . . To suppose that the conarium [pineal body] regu-

[10] This passage is probably of sufficient importance to be given in the original:

"(F. S. Anfractus quod in fig. 5 factitatum, si diligentius examinaveris, eo satis profunde descendere comperies, cerebrumque hiscere utrinque per anfractuosam fissuram, quæ in parte antica circa radicem oculorum principium suum habet, unde secundum temporis ossa retro supra spinalis medullæ radicem procedit, ac cerebri partem superiorem ab inferiore dividit.

"Arteriarum carotidum rami hic plurimi feruntur, tum in superficie, tum in fundo, quibus molesta illa in quibusdam capitis doloribus circa temporum regionem pulsatio accepta videtur referenda.)"

[11] A diligent search among modern authors has shown that they are not all ignorant as to the discoverer or describer of the fissure. I cite the following:

Haeser, Geschichte der Medicin, Vol. II, p. 311: "Eben so verdienen die Untersuchungen des berühmten De le Boë Sylvius über die Basis und die innere Theile des Gehirns, namentlich die noch jetzt seinen Namen führenden Grube, erwähnt zu werden."

Pagel, Geschichte der Medicin, p. 253, has a similar passage.

Poirier, Traité d'Anatomie Humaine, Vol. III, p. 346, says: "La scissure de Sylvius porte le nom de Le Boë Sylvius, anatomiste du XVIIe siècle."

Landouzy & Jayle, Glossaire Médicale, 1902, and Fort, J. A., Anatomie descriptive, 6th ed., Vol. III, 1902, also give credit to Franciscus de le Boë Sylvius.

lates the passage of the spirit is to misconceive the function of the vermiform process, and to give to the gland more importance than it deserves. . . . . This gland forms no part of the cerebrum and since it is attached outside the ventricle how can it have so powerful an action upon the conduit? . . . . If it is supposed that there ought to be near the canal a part suitable for regulating the entry of the spirit, that part is not the conarium, but the process like a worm which extends into the whole conduit [inferior vermiform process of the cerebellum]. . . . . On each side of the conduit there are thin elongated eminences of the brain called the nates [corpora quadrigemina]. They join like the thighs of a man that touch each other. . . . . The right and left parts of the canal are formed by these bodies, the superior parts are covered by a thin membrane which is attached to the corpora quadrigemina on either side."

Daremberg [12] remarks with regard to this that Galen probably did not see the aqueduct at all, but described the subarachnoid space extending from the third ventricle between the corpora quadrigemina and the inferior vermiform process,

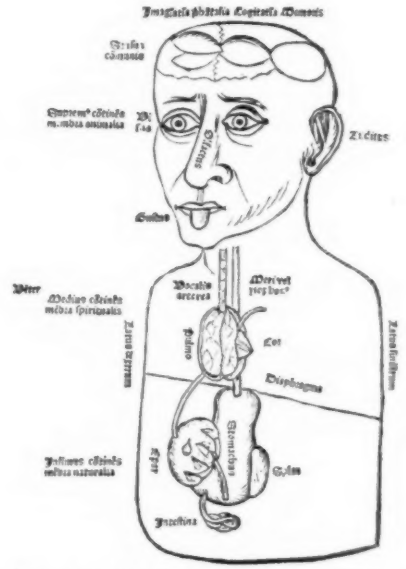

FIG. 4.—View of the Ventricles of the Brain. From the Philosophiæ naturalis compendium of Johannes Peyligk, 1499.

having torn through the thin roof of the fourth ventricle. Such a passage would be, as Galen says, quite ample and covered by thin membrane.

This view is amply supported by passages of Galen recently translated from the Arabic by Max Simon, as follows:

"The passage from the third to the fourth ventricle of which I have spoken goes between the two testes and has a peculiar cover like the capsule of the brain that unites all the arteries and veins. Over this cover is a portion of the brain resembling in shape a worm found in wood. It has accordingly been called by anatomists the vermiform process. . . . . Both ends of the passage that terminates in the posterior ventricle are covered by the vermiform process. When this is pushed backward it closes the passage, when moved forward it opens it. You may pass from the anterior to the posterior ventricle a round, smooth instrument whose calibre corresponds to the size of the opening of the passage. . . . . If nothing else is at hand use the blunt end of a writing pen." [13]

From this it would appear that the passage described by Galen was purely artificial. A communication between the third and fourth ventricles was, however, generally understood to exist, and we find it expressed or implied in Mundinus, Guy de Chauliac, Ketham, Peyligk and others. The ventricles were supposed to contain freely circulating "animal spirits," the *pneuma* of Galen, and the idea was common, traceable at least as far back as Poseidonius at the end of the fourth century, A. D., that imagination was located in the anterior ventricles, reason in the middle, memory in the posterior.

Some of the anatomists, however, evidently describe the real aqueduct.

Berengarius, in 1521, thirty-four years before the publication of the anatomical works of Jacobus Sylvius, says:

"In the posterior part of the middle [third] ventricle is a small foramen that leads to a deep vacuity . . . . situated between the

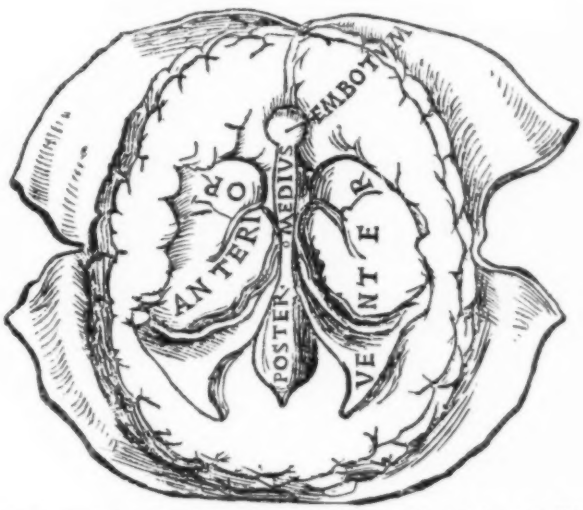

FIG. 5.—View of a Dissection of the Brain Showing a Passage from the Third into the Fourth Ventricle. From the Isagogæ breves of Berengarius Carpensis, 1523.

anterior and posterior parts of the brain and covered over with pia mater." [14] He has also a figure in which the aqueduct is clearly shown. See Fig. 5.

Vesalius, in 1543, clearly describes the passage and also depicts it in Figs. 7, 8 and 17 of the Fabrica. It is mentioned in several places, I will cite only the following, from p. 638:

"Behind and below this part [the testes and nates or corpora quadrigemina] is the anus-like orifice of the meatus that extends from the third to the fourth ventricle."

Servetus, who was burned at the stake by Calvin in 1553, was well aware of a communication between the ventricles.

[12] Œuvres de Galien, Vol. I, p. 566.

[13] Max Simon, Sieben Bücher Anatomie des Galens.

[14] Isagogæ breves in anatomiam humani corporis, p. 55a. A similar description is found in his Commentaria super Anatomia Mundini, 1521, p. ccccxlii, a.

Sprengel says that he made the aqueduct the seat of the soul. I find no confirmation of this in such transcriptions from the famous "Christianismi Restitutio" as I have been able to get. He appears to have adopted Galen's idea of the passage, calling the vermiform process "the janitor," which puzzles his commentator, Henri Tollin, very much.

Jacobus Sylvius's description in 1555 is as follows:

"From the third ventricle a long and narrow meatus, much larger in a living person, passes under the corpora quadrigemina into the fourth ventricle. . . . . The vermiform process is behind the corpora quadrigemina, and between their right and left sides is the meatus that runs from the middle ventricle to the last one. . . . . The vermiform process is a body composed of very many parts connected by delicate membranes, made up and jointed like a worm that feeds on old oak trees. It is borne upon the back of the corpora quadrigemina and held in place by bands on each side. It extends along the meatus that runs from the middle to the posterior ventricle and controls the animal spirits passing through the same." [15]

DECIMA SEPTIMI LIBRI FIGVRA.

DECIMAE FIGVRAE, EIVSDEMQVE CHA-
racterum Index.

H A C figura eam cerebri portionem expressimus, quæ dorsalis medullæ educit initium: dein cerebellum à dorsalis medullæ hic conspicua parte adempsimus est, & cerebri testis, & nates, et glans pineæ nucis imaginem referens, ac postremò cauitas ea dorsalis medullæ quæ cum cerebel-
li cauitate quartum cerebri efformat ventriculum, hic pariter exprimuntur.
A A Cerebri pars dorsalem producens medullam.
B Meatus ex tertio cerebri ventriculo in quartum sub cerebri natibus tendens, cuius terminum in
C. quartum pertinentem ventriculum C ingressus.

FIG. 6.—View of a Dissection of the Fourth Ventricle of the Brain Showing at "B" and "C" the Upper and Lower Openings of the Aqueduct of Sylvius. Figure 19, Book VII, of the Fabrica of Vesalius, 1543.

Here we see an attempt to follow Galen while recognizing Vesalius's description. The passage is first *under* the corpora quadrigemina, then *between their sides*. It is "much larger in the living" (how could he know?), and the passage of the mythical spirit through it is controlled by the vermiform process. Sylvius must have known of Vesalius's description, as he certainly read the Fabrica from beginning to end, and it was published twelve years before his little work appeared.

Arantius, in Chap. VII of his Observationes Anatomicæ, published in 1587, is the first to call the passage an *aqueduct*. He says:

"At the bottom of the so-called third ventricle, under the conarium, in that part where are situated the corpuscles known as the glutia [corpora quadrigemina], anatomists place the beginning of a sinus which they compare to a pen used for writing [calamus scriptorius of fourth ventricle]. This, if we carefully consider, seems by no means worthy of being called a ventricle, because it is rather a canal or aqueduct which, descending from the centre of the cerebrum to the occiput, that is to say from the third ventricle to the cistern or sinus of the brain between the cerebellum and the already formed spinal cord, carries the perfected animal spirits."

Franciscus Sylvius, in his Disputationes (1663), has the following passage:

"From this third ventricle formed between the conjoined roots of the spinal cord [crura cerebri] there is a *canal* or *aqueduct* passing towards the fourth ventricle of the cerebellum under our bridge [pons Varolii] and the nates and testes [corpora quadrigemina] that are placed as four eminences at the extremity of the same."

This appears to be the source of the ascription of the aqueduct to Sylvius. Sir Michael Foster, who appears to be singularly unfortunate when dealing with the Sylvian structures, says:

"We owe to him [Franciscus Sylvius] it is true, and not to his older namesake, the aqueduct of Sylvius."

Both Morgagni and Haller have called attention to the impropriety of naming the conduit the aqueduct of Sylvius.[16]

It was certainly generally known to anatomists long before either Sylvius, and it does not even owe its name of aqueduct to them.

In the nomenclature adopted by the German anatomists it has been designated the *aqueductus cerebri*, and as this cannot do injustice to anyone, perhaps it had better prevail.

The truth seems to be that Franciscus Sylvius was so singularly fortunate in teaching the anatomy of the brain that any apt designation was naturally ascribed to him.

But why, it may be asked, have we so far forgotten what we owe to this acute investigator that almost every modern authority ascribes his discoveries to someone else? This is another curious incident in the history of anatomy and can only be explained by a short account of the man himself.

François de le Boë, usually known as Franciscus Sylvius, was born at Hanau, Germany, in 1614. His family was an illustrious one that had been driven out of France by the religious persecutions of that dreadful time. The form of the name, which, if pure French, would be Dubois, indicates a northern origin or perhaps contact with the Spanish settlements in the low countries. The youth was early remarkable for bodily grace, mental activity and docile, gentle character. There seems to have been plenty of money to spare for his education, as he took university courses at Sedan, Basle, Leyden and some of the German universities, finally receiving his doctor's cap at Basle when twenty-three years old. This wandering from one university to another was by no means uncommon in those days, when the publications of eminent men

[15] Isagogæ in Hippocratis et Galeni anatomicos Libros, Lib. III, Caps. XX, XXI.

[16] Morgagni (J. B.): Epistolæ Anatomicæ, p. 34.
Haller (Albrecht): Elementa Physiologiæ, Vol. IV, p. 67.

were not spread widely as at present, and the most effectual means of profiting by their knowledge was to actually attend their courses. Settling to practice first in Hanau, he soon left his native town, pursued some studies in Paris and then established himself at Amsterdam, where he became famous as a practitioner. His specialties were anatomy and chemistry, for which he had shown great love throughout the course of his studies. He was constantly dissecting and experimenting and it was at this time that he added the notes to the Institutiones Anatomicæ of Bartholinus, of which mention has been made.

In July, 1658, he was offered the chair of the practice of medicine at Leyden, then one of the first universities of Europe. He hesitated, doubting whether he possessed that universal knowledge and solidity of mind necessary for a teacher in a great university, but finally accepted and immediately obtained a great success. His clear, elegant and sometimes eloquent speech, slow enough to be followed by even somewhat dull intellects, drew around his chair an immense concourse of pupils who regarded him with strong affection. Students were attracted to him from the most distant parts of Europe, from Russia, Poland, Hungary, Germany, Denmark, Sweden, Switzerland, France and England. He was most indefatigable in his devotion to his work, carrying on at the same time anatomy, both normal and pathological, pathology, clinical medicine, chemistry and physics. He is said to have dissected more than 300 cadavers, and always performed autopsies, whenever practicable, in order to confirm his diagnoses. One of his biographers says that by the careful and assiduous attention he gave his pupils he formed a body comparable to the trained and picked warriors that emerged from the belly of the Trojan horse. It is a fact that most of the famous anatomists of that epoch were formed either directly or indirectly by his teaching. Among them were DeGraaf, to whom we owe our first correct conception of the anatomy of the ovaries; Nicolas Stensen, who first showed the muscular nature of the heart and uterus, and conceived that there must be conducting tracts in the brain; Swammerdam, who discovered both the red corpuscles of the blood and the valves of the lymphatics, and became famous through his profound researches into the anatomy of insects; Van Horne, who discovered the thoracic duct in man; Willis, not indeed a pupil but a disciple, who more accurately described the base of the brain and the cranial nerves.

According to Sylvius the foundations of medical science were anatomy, chemistry and clinical medicine. As was said by Lucas Schacht, his colleague, who delivered his funeral oration, he comprehended that it was indispensable to have a profound knowledge, not only of the structure of the human body, but of its reactions, of the container as well as of the contained.

It was to the brain that he especially directed attention. The use of hardening solutions was then unknown, and he invented a system of sections in various directions by which the structures could be more effectively displayed. He described more accurately the interior of the ventricles and the sinuses of the dura mater. He did not confine himself to cerebral structures, but examined with care the lymphatics, the salivary glands, the pancreas and the spleen which were then exciting great attention from the discoveries of Pecquet, Rudbeck, Needham and others. Malpighi had not yet written, and the nature of glands had not yet been made clear by the microscope, yet Sylvius clearly pointed out the differences between acinous and ductless glands, naming the former conglomerate, the latter conglobate, appellations sometimes heard to-day.

In physiology he was also active. Harvey had put forth his treatise on the circulation of the blood only a few years before. In spite of the bigoted opposition of nearly all the older anatomists of Europe, Sylvius warmly espoused this doctrine, made it the basis of his teaching and brought forward new evidence of its truth; especially describing the action of the diaphragm which, before him, was not clearly understood. He called attention to the probable modification of the blood by the ductless glands, specifying the spleen, the thyroid, the thymus and the suprarenal capsules, and even suggesting that the liver might have a duplicate function and, besides secreting the bile, effect some important changes in the blood carried from it by the ascending vena cava. His insistence upon the functions of the spleen was so great that his adversaries derisively dubbed him *patronus lienis*, the keeper of the spleen, an appellation which he accepted with enthusiasm, saying that he wished no better title of honor than that of the discoverer of the function of that important and little-understood viscus. He anticipated our modern ideas in æsthesiology by distinguishing between the thermal and tactile senses. He was aware of the difference between arterial and venous blood and ascribed the color of the former to mixture with respired air. He appears to have understood the analogy between the processes of combustion and respiration.

In pathology, too, he attained distinction. He seems to have understood something of purulent infection, as he speaks of the return into the system of altered and corrupted blood. Also of the effect of insufficient excretion of urine; noticed the occurrence of tubercles in pulmonary phthisis, and advised listening to the bronchial sounds for the purpose of ascertaining the condition of the air tubes.

He was among the very first to permanently establish bedside instruction as a regular part of the medical curriculum. Something of the kind is rumored to have been done in classical times, and for a short period at the universities of Bologna and Padua, but it is really at the university of Leyden, where there was a small infirmary with only twelve beds, that Sylvius firmly established this instruction which he mentions as follows in his Epistola Apologetica, written in 1664:

"Called some five years ago and more to the chair of medicine, I at length assumed it, and have endeavored with all my might to make sure that my auditors should profit as much as possible by my industry and labor and go out as excellent physicians. To this end I pursued not only those things that it was truly necessary for them to investigate and find out, I went further in my way of teaching them, using especially a method not hitherto in use here nor perhaps elsewhere. I led them by the very hand into the practice of medicine, i. e., I took them daily into the public hospital for the purpose of seeing the sick to whose complaints and other notable symptoms I directed attention, asking immediately afterwards what they had observed in the disorders of the patient; their views as to the causes and proper treatment and their reasons for the same. Whenever differences of opinion arose among them concerning these things, I, in a quiet way, pitted against each other those holding different opinions, in order that they might mutually satisfy themselves by as solid reasons as possible drawn from every source, finally giving my own judgment regarding the various views. With me they confirmed the happy results of the treatment, when God rewarded our labors by the return to health of the patients, or assisted in the examination of the cadavers when the patients finally paid the inevitable tribute to death."

His colleague, Lucas Schacht, describes his method of instruction as follows:

"When he came with his pupils to the patient and began to teach, he appeared completely in the dark as to the causes or the nature of the affection the patient was suffering from, and at first expressed no opinion upon the case; he then began by questions put to different members of his audience to fish out [expiscabatur] everything and finally united the facts discovered in this manner into a complete picture of the disease in such a way that the students received the impression that they had themselves made the diagnosis and not learnt it from him."

I think that it must now be apparent that we have in Franciscus Sylvius one of the great original thinkers of the seventeenth century; of the period that produced Harvey, Descartes, Leibnitz and Malpighi; a mind eager to obtain new facts and to theorize regarding them. In order to understand what he did in the field of therapeutics it will be necessary to consider briefly the state of the science at that time.

There had been several efforts to arrive at a rational theory of medicine. The Galenical remedies then in vogue were for the most part fanciful attempts to find qualities that might either agree or disagree with the disease, and the prescriptions were of the most portentous character, not infrequently containing scores of ingredients. Chemistry, as we now understand it, was unknown, chemical affinity was but dimly comprehended and the chemical elements not yet conceived. The old idea, traceable back to Empedocles, that the universe is formed of four elements, earth, air, fire and water, was still prevalent. Observation of chemical phenomena had merely led to alchemy, vain attempts at the transmutation of metals and the search for the elixir of life. Physiological processes were considered to be too mysterious to be fathomed, and under the control of mythical forces not existing outside of the body.

Paracelsus, course, blustering and arrogant, gave a rude shock to this Galenical tradition. He cried out:

"Away with these false disciples who hold that this divine science [alchemy], which they dishonor and prostitute, has no other end than that of making gold and silver! True alchemy has but one aim and object, to extract the quintessence of things, and to prepare arcana, tinctures and elixirs which may restore to man the health and soundness he has lost."

It was with trumpet blasts like this that the modern science of chemistry was ushered in.

It should be remembered that most of the fulminations of Paracelsus occurred at Basle, where he was a professor, and where he publicly burned the books of Galen and Avicenna in 1527, and that Sylvius took his final course of study there. It is certainly reasonable to suppose that the traditions concerning that strange enthusiast may have profoundly influenced the young man.

Van Helmont followed Paracelsus and adopted in great measure his doctrines. Like him, he conceived that the processes of the body were presided over by a vital entity called an *archæus*. He introduced into chemistry the idea of gases, in fact coined the word which we now use. This led him to consider that the active principle by which the archæus worked was a *ferment*, the chief agent in digestion. He also taught what was known as "The Great Secret"; that there is an energy in everyone capable of affecting other objects through the suggestion and power of the imagination. It is not difficult to parallel this philosophy with that professed by some at the present day.

Sylvius was fully acquainted with the philosophical speculations of his time. His inaugural discourse on assuming the chair at Leyden was an attack on the doctrine of innate ideas. He was a much better anatomist than either Paracelsus or Van Helmont, and declared that no one can know the causes of the lesions of functions who does not understand the parts through which those functions act. Rejecting the *archæus*, he held that the physiological phenomena of the body are wholly chemical. The ferments of Van Helmont he considered to be chemical substances contained in the various digestive juices, especially in the saliva, the pancreatic juice and the bile. Their combination produced an *effervescence* which played a great part, both in the digestion of the food and in the final production of animal spirits in the brain. These spirits, transmitted by the nerves, produced sensation and motion, stored in the brain were the source of imagination and reason.

When reading the early writers in any science we are liable to be misled by their use of terms. While the names they employ seem fantastic and strange, because our point of view

has changed, we often find, if we examine closely and translate their language into modern scientific speech, that the difference is not so very great. We no longer speak of "animal spirits" formed in the brain and distributed by the nerves, but we do consider the brain as a power-house wherein resides a force capable of effecting changes in the nerves transmissible to remote parts of the body.

It was upon this theory, here sketched only in brief outline, that his system of therapeutics was based. Excess of acid or of alkali in the digestive juices produced corresponding "acridities" which were to be overcome by medication which he looked upon as applied chemistry. He used many remedies internally that others rejected because of deleterious effects—mercury, nitrate of silver, sulphate of zinc, etc.—and was particularly enthusiastic about antimony.

FIG. 7.—Portrait of Franciscus De Le Boe Sylvius.

It is easy for us to see, in the light of the twentieth century, that his scheme was far too simple, that he had no idea of the complexity of vital phenomena nor of the chemical constitution or therapeutic value of the drugs that he employed. Yet we must confess that his "New Idea in Medicine," as he called it, was of great value and is bearing fruit with us to-day. At present, with improved apparatus in every field, we are earnestly striving to ascertain the chemical reactions occurring in the living body so as to base upon them a rational system of therapeutics. Sylvius did the same.

His system had a great vogue and secured many adherents throughout Europe. In fact it obtained such renown that by it Franciscus Sylvius is generally known. His attainments as an anatomist, a physiologist, a clinician are forgotten, but as the founder of an obsolete system he is casually mentioned on a subordinate page of history. That system, like all founded on imperfect knowledge, was doomed to failure. It lasted out its day, was superseded by other plausible theories or by the wise "expectant treatment" of Sydenham, and when it passed Sylvius too suffered an eclipse. While the fame of Vesalius caused many discoveries to be improperly assigned to his preceptor, the elder Sylvius, the younger man was discredited because his system of therapeutics was deemed unsound.

It was said by his opponents that the system killed more men than perished in the Thirty Years' War. This is, of course, a gross exaggeration, but no doubt his theories did great harm in the hands of ignorant sciolists. Sylvius, himself, had a great and probably deserved reputation as a practitioner. Like many other founders of systems, he doubtless practiced better than he preached.

In person, Sylvius is described as remarkably handsome, tall and commanding, with regular features. He had a sweet and amicable disposition which made him many friends that he always kept. In scientific discussion he was never caustic nor offensive. He was adored by the poor whom he often treated gratis, giving them medicines that he, himself, prepared.

He was twice married, his second wife and only child died in an epidemic of relapsing fever in 1668, a disease to which he also nearly succumbed in the following year. The political troubles of his country made the year 1672 a very trying one for him, and when in that year he was again seized with a fever he said to his friend, Lucas Schacht: "I know as well as you the gravity of this disorder. I escaped three years ago; this time I shall die." His prediction was fulfilled, for he ceased to live November 14, 1672.

It is a sign of the deep and serious nature of the man that he had anticipated this event by erecting, seven years before, in the choir of St. Peter's Church, in Leyden, a tomb upon which was inscribed the following:

FRANCISCUS DELEBOE SYLVIUS,
MEDICINAE PRACTICAE PROFESSOR,
TAM HUMANAE FRAGILITATIS
QUAM OBREPENTIS PLERISQUE MORTIS MEMOR,
DE COMPARANDO TRANQUILLO INSTANTI CADAVERI
SEPULCHRO
AC DE CONSTITUENDA RUENTI CORPORE DOMO
AEQUE COGITABAT SERIO.
LUGDUNI BATAVORUM,
MDCXLV.

Franciscus de le Boe Sylvius,
Professor of the Practice of Medicine,
mindful of human infirmity
and of the often stealthy approach of death,
bethought him to prepare against that time
a quiet sepulchre for his remains,
a house for his mortal body.
At Leyden,
1665.

THE EPIDEMIC OF THE INDIANS OF NEW ENGLAND, 1616-1620,* WITH REMARKS ON NATIVE AMERICAN INFECTIONS.

By Herbert U. Williams, M. D., Buffalo, N. Y.

There is no more burning problem for solution by anthropologists than the discovery of the origin of the great races of Europe, Asia, Africa and America as we find them to-day. Using the word race in a broad sense, as one speaks of a white or a negro race, there seems to have been a single American race (excluding the Eskimo).[1]

Our North American Indians, the Aztecs of Mexico, the Mayas of Central America, the Peruvians, the savages of South America clear to Patagonia and Tierra del Fuego belonged to it alike. Whence this American race came no one can say. Perhaps man originated in America. More probably the American race came in the first place from Asia. At all events, the red men became a separate stock a very long time ago. They lived practically apart from the rest of mankind until 1492. They were as characteristic a product of American soil as the possum or the rattlesnake, as corn or tobacco. While in the old world governments and cultures developed, flourished and fell into decay, the American race was painfully working its way towards the beginnings of a civilization. John Fiske says: "There is something solemn and impressive in the spectacle of human life thus going on for countless ages in the eastern and western halves of our planet, each all unknown to the other and uninfluenced by it." There is no evidence to show that the hardy Vikings, who reached this continent before the time of Columbus, made any mark upon it. And if Chinese, Japanese or Polynesian adventurers were ever blown across the Pacific to America, it has not been proved, and they have left no traces that can be recognized definitely. Nor need we be much concerned with the colony of Northmen that long lingered in Greenland, for their contact with the rest of America through the medium of the Eskimo was probably very slight.

From this point of view it is of interest to study the relation of the American race to infectious diseases. Any communicable disease occurring at the time of the discovery of America on either the eastern or the western continent exclusively probably originated on that continent. Any communicable disease belonging at that date equally to both halves of the world may probably be referred to a time at least as remote as that when the American race separated from the rest of mankind.

Speculations as to the manner in which the great infections arose are mostly futile. Doubtless the species of bacteria or other organisms that now produce disease evolved from some of the swarming thousands of harmless kinds. Further than this we cannot say. However, we may possibly learn something from history of the time and place at which the transformation happened. It would be the study of a lifetime for any single man to investigate the histories of the various infections. The subject is one of immense difficulty, for the records of ancient writers leave the early histories of most of them in great doubt. However, such superficial examination of the literature as it has been possible to make points to the very curious conclusion that, as far as is known, the American race developed almost no peculiarly American infections. Many times new epidemic diseases from Europe have spread over America and have been very fatal to the Indians, but the reverse seems not to have been recorded if it ever happened, unless yellow fever and syphilis may be exceptions.

The Origin of the Great Infectious Maladies.

It has been impossible for the present writer to do more than to examine a few of the standard text-books (especially Hirsch),[2] but from them one learns that certain facts in the history of the infections seem fairly well established.

(1) Small-pox, cholera, leprosy, bubonic plague, mumps, glanders, anthrax and rabies are diseases of great antiquity, and all seem to have arisen in the old world. Small-pox has been known in eastern Asia from an early period; it first came to America with the Spaniards, and made fearful ravages among the Indians. The birthplace of cholera was probably the delta of the Ganges in India, whence it extended over the rest of the world, including the western continent, within quite recent years. Leprosy has been known in both Asia and Africa since ancient times; the crusades helped to spread it through Europe; it was conveyed to America by both African negroes and European whites. Bubonic plague also probably originated in the Orient and seems to have been unknown on the American continent till recently. Glanders was described in Europe in the fourth and fifth centuries. It is likely that anthrax had a similar history, and it may be placed under this heading provisionally. Rabies was known in Europe long ago; it was described by Aristotle. It is said to have appeared first in America, near Boston, in 1768. But as dogs were used widely

* Read before the Johns Hopkins Hospital Historical Club, January, 1909.

[1] When the material collected by the Jessup expedition has been fully worked out, it may become necessary to modify these statements slightly. It is already alleged that a few tribes of northeastern Siberia may properly be classed with the American race, while they differ from other Asiatics. (Boas, Proceedings International Congress of Americanists, Thirteenth Session, New York, 1902, page 91; also American Museum Journal, Vol. 3, page 115.) It does not follow that the American race came from Asia, although these conclusions from the Jessup expedition make a powerful argument for such a theory. In any case, the position taken in the present paper concerning the effect of the isolation of the American race upon the development of communicable diseases would not be influenced greatly. See also the recent paper by Dr. W. H. Holmes, Chief of the Bureau of American Ethnology (Smithsonian Institution), on The Peopling of America.

[2] Hirsch, Historical and Geographical Pathology.

by the Eskimos and the Indians, the possible occurrence of rabies from native sources should be borne in mind.[3] In connection with the above group, the sleeping sickness and other trypanosome infections described for the African continent may also be considered provisionally.

(2) With regard to another group of infections, history is less definite, though it is not sharply separated from the preceding group. It includes tuberculosis, diphtheria, influenza, gonorrhœa, beriberi and malaria. While all of them appear to have been described in Europe before the discovery of America, and some of them, like tuberculosis, in the earliest medical writings, they were not clearly differentiated till quite recently. The manner in which they spread over the world is, therefore, mostly a matter of conjecture. The writer has met with no allusion to their having been observed among the aborigines of America by early explorers, but cannot claim to have examined the evidence even superficially as yet. Tuberculosis, in particular, is so widely spread among the lower animals (occurring in cold-blooded animals and birds as well as in mammals) that it may well have been one of the most ancient infections in man and common to several races of the human species. On the other hand, many writers have remarked upon its ravages among the Indians since the arrival of white men.[4] Malaria was undoubtedly known to the ancients in the old world, but it will probably be impossible to determine whether or not it occurred in America before the time of Columbus. As its parasite has so complicated a developmental cycle, and as analogous hematozoa are found in birds and in cold-blooded animals, we may presume that it is a very ancient disease. For this reason, it may have been widely spread among the races of man from their earliest beginnings. Manson has recently suggested an explanation for the division of the cycle of the malarial parasite between man and the mosquito, in which he assumes that the common ancestor of man and the mosquito was the original host of the ancestor of the malarial parasite. This theory would carry the origin of malaria back to the earlier geological periods through an interval of practically unthinkable millions of years.[5]

(3) A third group of infections may be made of typhoid, typhus and relapsing fevers, measles, German measles, scarlet fever, chicken-pox, whooping cough, chancroid, Malta fever and dengue. All of these have been differentiated since the discovery of America, and most of them very recently. While all of them are probably ancient, and some of them appear to have been described long ago, the descriptions are not definite. Another might be added to this list in dysentery, the causation of which is still very imperfectly understood.

It is possible that some of the diseases in this group originated in America and were conveyed to Europe. If that is the case, the fact seems to have been overlooked at the time when it may have happened.

(4) The infections of the pyogenic group (including pneumonia, meningitis, erysipelas and tetanus) have been left out of consideration on acount of the peculiar difficulties that their present widespread occurrence offers. The parasitic higher fungi and worms have not been included, as the problem is intricate enough without having them to reckon with.

(5) This leaves two important infections that some writers believe to have originated on the American continent, viz., syphilis and yellow fever. The present paper is not the place in which to discuss the merits of these questions. Personally, the present writer has been unable to form an opinion in either case, and regards the evidence on both sides as not convincing. In the Rocky Mountain region of Wyoming, Montana and Idaho the disease called spotted or tick fever is known, which is probably due to some undiscovered infectious agent. It resembles typhus fever in many respects. If it is a new specific disease, it is very likely of American origin. It has been alleged that this disease used to occur among the Indians, but that seems to be quite doubtful. The milk fever of the middle-western and southern United States, the skin disease of Mexico called "pinta" and Peruvian wart (verruga or Carrion's disease), while very probably native to America, are, like the Rocky Mountain spotted fever, confined to a comparatively limited area. Yellow fever and syphilis are the only diseases in this group entitled to rank among the great infectious maladies of the world. If infections peculiar to America have ever arisen and wholly disappeared again in prehistoric times, we have no means of knowing it.

Social Conditions of the American Race.

The conditions of life among the American tribes might be expected to have important bearings on the evolution and spread of infections. There were few large communities, and there were no great states with stable governments, hardly excepting even Mexico and Peru. The development of commercial intercourse and travel was not to be compared with their development in the old world. The American race had no domestic animal but the dog, except that in Peru the llama was used to some extent.[6] The lack of a domestic animal was a powerful factor in the slow growth of culture among American tribes. That this lack may also have been an important factor in making infections less frequent seems plausible when we recall the relation of the horse to glanders, the sheep to anthrax, the cow to tuberculosis and the goat to Malta fever. The common house rat, which is a native of the old world,

[3] V. A. Moore, Infectious Diseases of Animals, Ithaca, 1902, p. 307.

[4] Dr. Hrdlicka, of the United States National Museum, spent much time among the Indians of the southwestern States and northern Mexico, where the natives have been comparatively little influenced by contact with white men and still live much as their ancestors did. He found pulmonary diseases, apparently pneumonia and bronchitis (?) very common; but while he reported that tuberculosis was frequent and very fatal among certain tribes, he was of the impression that it had been communicated to the Indians by white men. (Washington Medical Annals, Vol. IV, No. 6.)

[5] Manson, The Lancet, Oct. 3, 1908.

[6] The guinea-pig, the turkey and the duck might perhaps be added.

may almost be counted as a domestic animal and is of prime importance in connection with bubonic plague. Even the bedbug, which, if not a domestic animal, has been the inseparable companion of man in the old world, cannot be overlooked as a carrier of germs (alleged for relapsing fever); and it probably came to America with the white man. The conditions of existence for the American race were greatly ameliorated by the use of maize or Indian corn, which yielded a rich harvest, even to a very crude kind of agriculture. With a poet's fine appreciation of great essential truths, Longfellow well used Indian corn as the prize that Hiawatha won for his people by his wrestling contest. However, most of the Indians were improvident: their provision of corn, if they raised it, was often insufficient, their food supplies of fish and game were precarious. They lived very largely in the open air; they suffered greatly at times from cold, wet and severe physical strain. Although they were acquainted with tobacco, their use of alcohol was not to be compared in extent with the practice of the old world. Many tribes were cannibals.

Some of the conditions of life enumerated seem to have important bearings on the development of infectious diseases, or rather the lack of them, and it is suggestive to compare them with the conditions of society that probably prevailed in China, Hindustan and Egypt at the time when the infections, the history of which is best known, were first described by ancient writers.

Rarity of Native American Infections.

The brief synopsis that has been made shows that our knowledge of the origin of the infectious diseases is extremely imperfect. But, such as it is, it indicates that the American race during its sojourn of some thousands of years apart from the rest of mankind developed a surprisingly small number of infections peculiar to it. In this respect the western continent offers a singular contrast to the eastern. Although more complete study of the subject may show what has been stated of certain particular infections to be incorrect, it does not seem likely to disprove the main principle.

Need for Study of Early Epidemics.

The ideas that have been advanced above have been suggested by reading done at odd times without any very definite purpose. They are advanced, tentatively and with much hesitation, only because the writer appreciates the hopelessness of attempting thorough, systematic study of this enormous field. One fact, however, has become perfectly clear: that such materials as history and tradition have left bearing on disease among the Indian tribes in the early days need to be collected and studied. That is particularly true of epidemics, for history and tradition assert that the Indians have also suffered from epidemics.

The Great Pestilence of the Indians of New England, 1616-1620.

These considerations have led the writer to undertake the study of the pestilence that occurred among the Indians of New England about 1616 to 1620. Its effects were so terrible that the Puritans found the country almost depopulated; it made such an impression that stories of this epidemic seem to have become fireside legends during the early days of the colonies. For we meet with allusions to it repeatedly in the quaintly worded records of the period. The Puritans were fond of speaking in scriptural language and of drawing parallels between their own case and that of the Children of Israel. In their books and tracts we often find the epidemic regarded as the method by which Providence removed the savages to make room for Englishmen in general and for Puritans in particular. There seems to be no doubt that the settlement of New England was rendered a much simpler affair than it otherwise would have been by reason of the absence of any considerable Indian population along the coast. In the case of the Pilgrims at Plymouth, the very existence of their colony in its early days depended on that circumstance. Histories are apt to pay scant attention to disease, although its results often reach farther than those of war. But nearly every history that treats of the New England colonies tells of this epidemic. It has been discussed by Noah Webster in his Brief History of Epidemic and Pestilential Diseases (Vol. I, p, 281): by Dr. Oliver Wendell Holmes in a Lowell Institute lecture given in 1869; by Dr. Samuel A. Green in his essay on the History of Medicine in Massachusetts, 1881; and by Mr. Charles Francis Adams, both in editing the Prince Society's edition of Morton's New English Canaan, and, at considerable length, in his Three Episodes of Massachusetts History (Boston, 1892): but the present writer cannot find that it has by itself ever been the subject of separate and special inquiry. To discover what may be learned of its nature and its source will be the purpose of this paper.

First, however, it is necessary to examine the history of the New England coast during the period just preceding its colonization. That period is merely one episode in the wonderful story of the conquest of the western continent. In the letters of tough old sea captains and in the tales of adventurous furtraders of the seventeenth century, one learns to know stern, brave and sometimes cruel men; for their spiritual great-grandsons you must look to-day on the banks of Newfoundland or in the far northwest.

Early History.

Although the coast of New England had been visited by some of the earliest discoverers, it was not until about the year 1600 that the region was at all thoroughly explored. The first part of the seventeenth century was in fact the time when the settlement of eastern North America in general was seriously undertaken. The beginning of Nova Scotia dates from 1604, of Jamestown from 1607, of Quebec from 1608, of New York from 1614. During these years, the shores of Maine and Massachusetts were visited by some of those rare sailors whose names are familiar to every school boy: Champlain, Henry Hudson, Bartholomew Gosnold, that incomparable prince of adventurers, Captain John Smith, and many others. In 1606, two English companies were formed, the

Plymouth or North Virginia Company and the London or Virginia Company, for the exploiting of the northern and southern parts of the coast respectively. The English had cherished nearly a century-full of luscious dreams of picking up such treasures in the northern part of America as the Spaniards had found in Mexico and Peru. But they were beginning to realize that these had been dreams indeed, and at last the honest resources of the country were to be developed in a business-like fashion. That desirable result was not, however, achieved immediately.

In 1607, the Plymouth Company sent a considerable party to found a settlement at the mouth of the Kennebec River in Maine. They took with them an Indian who had been brought to England earlier by Captain Weymouth.[7] But the settlers returned discouraged after experiencing a single one of the sharp and unwelcome winters that often visit those latitudes. They have since been known as the Popham colony.

The New England coast was sought during this period not only for purposes of exploration and colonization, but by numerous traders and fishermen who had already been frequenting the Banks of Newfoundland for a century. The English fishermen used as a kind of headquarters the island of Monhegan, which is about half way between Portland and Mount Desert. But the Dutch, the French and the Basques came thither as well. When Bartholomew Gosnold visited the shores of New England in 1602, he found evidences that Basque fishermen had been before him.[8] Sir Ferdinando Gorges[9] complained of the loose character of the roving traders during his time, that they taught the Indians to drink themselves drunk, and debauched their women. In this picture of three hundred years ago, we can already discern the prototype of the futile and alcoholic Indian brave of our modern reservations. What is important for our purposes is the evident fact that there were ample opportunities for the interchange of infections between the traders and the natives.

The Indian Tribes of the New England Coast.

The descriptions of the New England coast which the explorers have left show that they found it occupied by thriving Indian communities. But when we remember that the powerful Iroquois Five Nations of New York State numbered only sixteen thousand persons, it is evident that the Indian population between the Penobscot River and Cape Cod was after all only a matter of a few thousands. The Indians were of the Algonquin family, belonging to several different tribes, whose exact limits it is neither easy nor very important for us to determine. Approximately, the principal tribes along the coast from north to south were (according to Palfrey's classification, founded apparently on Gookin), as follows:

Abnakis or Tarratines, in Maine, west of the Penobscot River.

Pennacooks or Pawtuckets, in New Hampshire.

Massachusetts, about Massachusetts Bay.

Wampanoags or Pokanokets, about Plymouth and Cape Cod.

Narragansetts and Pequots to the west, in Rhode Island and Connecticut.

Their habits of life differed from those of the other Indians of eastern North America in no important particular. Their settlements were sometimes surrounded by stockades, which is evidence that they were not in the main a roving people. Their houses were wretched wigwams covered with bark or mats, crowded, evil-smelling and thick with smoke. Their scanty clothing consisted of skins. Their personal habits were filthy. Fleas and lice abounded within their wigwams.[10] In the summer time mosquitoes were omnipresent, and the early descriptions pay tributes to the pugnacity of these insects in terms of emphatic disapproval. As was the case with most of the Indians in the temperate parts of North America, while the men were at times active hunters, their living depended mainly upon agriculture. Corn (maize) was their mainstay, although they raised also beans, squashes and pumpkins. Fish and shellfish were abundant and formed a very important part of their food. It is not entirely accident that corn and beans, pumpkins and codfish are still held in such honorable esteem by New Englanders. The Indian women here as elsewhere did the drudgery and much of the hard work.

On numerous occasions small parties of Indians were kidnapped from New England by sailors and carried to Europe, where they were regarded with singular interest. This abominable practice began with the first voyage of Columbus. Evidently Shakespeare was familiar with it. "When they will not give a doit to relieve a lame beggar, they will lay out ten to see a dead Indian." (Tempest, Act II, Scene 2.) Certainly live Indians were shown in London as wonders. Several Indians from New England who had been taken to Europe are known to have been brought back subsequently. One such case has already been mentioned, in connection with the Popham colony (1607), and the same happened on a ship in the year 1614, shortly before the outbreak of the great epidemic among the Indians.[11] The bearing of this fact on the possible importation of a communicable disease from Europe to the Indians in New England is obvious.

At the time of Captain John Smith's expedition to New England in 1614, a ship commanded by one Hunt was left to make the return voyage by way of Spain. On his own account, this scoundrel Hunt captured between twenty and thirty Indians near the place where Plymouth was founded six years later. He carried the Indians to Spain and sold some of them

[7] Strachey, History of Travel into Virginia, Mass. Hist. Soc. Coll., Series 4, Vol. I.

[8] See various original documents on Gosnold's voyage, in Mass. Hist. Soc. Coll., Series 3, Vol. VIII.

[9] See Gorges, Briefe Narration, etc., Mass. Hist. Soc. Coll., Series 3, Vol. VI, p. 70.

[10] The bed-bug seems to have been introduced from Europe. See U. S. Dept. of Agriculture. Bureau of Entomology, Circular No. 47, quoting Kalm; also Josselyn, Two Voyages to New England, Mass. Hist. Soc. Coll., Series 3, Vol. III, p. 289.

[11] Captain Hobson, who had the Indians Manawet and Epenow. Manawet died shortly after the ship arrived; Epenow escaped to the shore, and thereafter nursed a very natural hatred for the English, which he finally visited on Captain Dermer, a good friend to the Indians. See below. See also A Brief Relation, etc., of New England, Mass. Hist. Soc. Coll., Series 2, Vol. IX, p. 1.

as slaves. But one at least made his way back to America, and took part in the explorations by Captain Dermer, who will be referred to hereafter. This good fellow, usually called Squanto (or Tisquantum), was destined to be of great service to the Pilgrims at Plymouth. He became so attached to his English friends that he is said to have bequeathed to them his poor little treasures and to have begged them to pray that he might go to their heaven when he died. As for Hunt, one is tempted to hope that his spirit may somewhere, probably not in heaven, be conscious that his name is execrated by all writers that mention him, from worthy John Smith to those of the present day.

As far as the present writer has been able to discover, although Smith and several others were on the coast of New England in 1614, and one or more vessels in 1615 and in the summer of 1616, they have left no account of any unusual sickness.

History of the Great Epidemic.

The first report of an epidemic among the Indians seems to have been brought back by an expedition sent to the coast of Maine by Sir Ferdinando Gorges. Students of colonial history believe the date to have been 1616-1617, and the locality where the English wintered the banks of the Saco River. Gorges, who was governor of Plymouth in England, was a man of much energy, though there was a blot on his escutcheon, which has nothing to do with our subject. He was the leading spirit of the Plymouth Company, which is not to be confused with the Plymouth colony later established in New England by the party of settlers called the Pilgrims. Gorges was active in attempts to interest others in developing the resources of his company's concession. His references to the epidemic are so brief that they may be quoted.[12]

This narrative of Gorges was written when he was an old man, many years after the events referred to happened. It is not improbable that his agent, Richard Vines, kept a journal and made a written report. The writer has been unable to learn of the existence of such documents. Palfrey states that Gorges had an immense quantity of papers relating to New England, which have disappeared. As Vines is said to have been a physician, his account of the epidemic would have the highest value. It seems to the present writer not certain that any Europeans, except his party, personally observed the disease. Vines was evidently a man of ability, for later on he held high positions under Gorges in the early days of the Maine colony. All good lovers of the mountains will be interested to recall that Vines was one of the leaders of the first party of white men to visit the summit of Mt. Washington. In 1645 he went to England and from there to Barbadoes where he died.

The epidemic is mentioned next in a letter of Captain Thomas Dermer, who had already been on a voyage with Smith as well as at Newfoundland. This Dermer seems to have been a brave and determined man and a fine fellow. Governor Bradford speaks somewhat slightingly of him, but one may suspect that the stern old Calvinist was prejudiced against all agents of the aristocrats in England. Dermer went in one of two ships sent by the company. He missed the other ship, left his own vessel at Monhegan, and embarked on the daring enterprise of exploring the coast in a small boat. The Indian Squanto, who had been taken to Europe by Hunt five years before, was one of the little party. Dermer's brief story[13] of what he saw of disease among the Indians is preserved in a letter as follows:

To his Worshipfull Friend M. Samuel Purchas, Preacher of the Word, at the Church a little within Ludgate, London.

Sir: It was the nineteenth of May, before I was fitted for my discovery, when from Monahiggan I set sayle in an open Pinnace of five tun, for the Iland I told you of. I passed alongst the Coast where I found some antient Plantations, not long since populous now utterly void; in other places a remnant remaines, but not free of sicknesse. Their disease the Plague, for wee might perceive the sores of some that had escaped, who described the spots of such as usually die. When I arrived at my savage's native Country (finding all dead) I travelled alongst a daies journey Westward, to a place called Nummastaquyt (now Middleboro), where finding inhabitants, I despatched a Messenger a dayes journey further West, to Poconaokit, which bordereth on the sea; whence came to see me two Kings, attended with a guard of fiftie armed men, who being well satisfied with that my Savage and I discoursed unto them (being desirous of noveltie) gave mee content in whatsoever I demanded, where I found that former relations were true. Here I redeemed a Frenchman, and afterwards another at Matachusit, who three yeeres since escaped shipwracke at the northeast of Cape Cod.

The date in the margin is 1619.

The plucky Dermer finally reached Virginia. But that rare spirit which animates the born explorer drove him back to the wild and dangerous coast of New England, where, in the course of the year, he was terribly wounded in an encounter with the savages[14] on the island of Martha's Vineyard. He made his

[12] Gorges, Briefe Narration, etc., Mass. Hist. Soc. Coll., Series 3, Vol. VI, p. 57.

Finding I could no longer be seconded by others, I became an owner of a ship myself, fit for that employment, and under color of fishing and trade, I got a master and company for her, to which I sent Vines and others my own servants with their provision for trade and discovery, appointing them to leave the ship and ship's company for to follow their business in the usual place (for I knew they would not be drawn to seek by any means). By these and the help of the natives formerly sent over, I came to be truly informed of so much as gave me assurance that in time I should want no undertakers, though as yet I was forced to hire men to stay there the winter quarters at extreme rates, and not without danger, for that the war had consumed the Bashaba and the most of the great sagamores, with such men of action as followed them, and those that remained were sore afflicted with the plague, so that the country was in a manner left void of inhabitants. Notwithstanding, Vines and the rest with him that lay in the cabins with those people that died, some more, some less mightily (blessed be God for it), not one of them ever felt their heads to ache while they stayed there.

[13] Purchas's Pilgrims, Vol. IV, 1778. Edition of Hakluyt Society, Vol. XIX.

[14] The Indian Epenow, mentioned above, seems to have been the leading spirit of the attacking party.

way to Virginia a second time, where he died, some say of his wounds and some of the diseases prevalent in that colony.

THE PILGRIMS.

Late in 1620, and a few months after Dermer had left those parts, the ship Mayflower landed at Plymouth. The colonists [15] had planned to go to Virginia, but now changed their resolution and remained where they found themselves. Our next news of the epidemic among the Indians occurs in the relation of the progress of the settlement written probably by Winslow and Bradford. It is a homely narrative, having in its earlier parts nothing to tell of but the cruel sufferings of these devoted people. Their splendid courage, their sublime patience are beyond all praise from us. Out of one hundred and one persons, fifty-one died during the first year, apparently from exposure, insufficient food and scurvy. In the course of their explorations made in that winter they found an iron kettle and other indications that Europeans had been in the country before them. About the middle of March an Indian named Samoset visited them. He had learned some English from fishermen at Monhegan, and greeted them with the word "welcome."

To continue with a quotation from the relation: [16]

He told us that the place where we now live is called Patuxet, and that about four years ago all the inhabitants died of an extraordinary plague, and there is neither man, woman, nor child remaining, as indeed we have found none.

A few days later the Indian Squanto, already referred to, appeared on the scene. Satisfactory relations with the natives were soon established, and, after some weeks, Winslow was sent on a mission to Massasoit, the chief of the Wampanoags, to whom the region belonged. Squanto served as interpreter. On this journey evidences of the epidemic were encountered, which are reported in Bradford's History of Plymouth Plantation [17] more fully than in Winslow's account.

They found his place to be 40 miles from hence, **ye soyle good, and ye people not many, being dead and abundantly wasted in ye late great mortalitie which fell in all these parts aboute *three years* before ye coming of ye English, wherein thousands of them dyed, they not being able to burie one another; ther sculs and bones were found in many places lying still above ground where their houses and dwellings had been; a very sad spectacle to behould. But they brought word that ye Narighansets lived but on ye other side of that great bay and were a strong people, and many in number, living compacte togeather, and had not been at all touched with this wasting plague.**

Thomas Morton, who enjoys a somewhat dubious celebrity for the scandalous doings at his settlement of Merrymount, near Quincy, Massachusetts, came to the country about two years after the Pilgrims had landed. He has left a pungent book, telling his experiences. Among other things, he corroborates Bradford's statement that skulls and bones of Indians that had died of the epidemic were to be seen lying on the ground in great numbers. He further remarks that ordinarily it was the custom of the Indians to bury their dead ceremoniously.[18]

An amusing incident is told by Winslow,[19] which may be repeated, as it is mentioned in a number of the other early accounts of the epidemic:

Here let me not omit one notable, though wicked, practice of this Tisquantum (Squanto); who to the end he might posses his countrymen with the greater fear of us, and so consequently of himself, told them we had the plague buried in our store-house; which, at our pleasure, we could send forth to what place or people we would, and destroy them therewith, though we stirred not from home. Being, upon the forenamed brabbles, sent for by the governour to this place, where Hobbamock [20] was and some other of us, the ground being broke in the midst of the house, whereunder certain barrels of powder were buried, though unknown to him, Hobbamock asked him what it meant? To whom he readily answered: That was the place, wherein the plague was buried, whereof he formerly told him and others. After this Hobbamock asked one of our people, whether such a thing were, and whether we had such a command of it. Who answered, No; but the God of the English had it in store, and could send it at his pleasure, to this destruction of his and our enemies. This was, as I take it, about the end of May, 1622.

Poor silly Squanto, with his childish lie about the "big medicine" of his English friends, reminds one of the boy who bragged of the mortgage on his father's house. To our thinking, Mr. Winslow took the matter too seriously, but his eye may have twinkled while his pen wrote the harsh words that discipline demanded.

One other reference from Winslow's relations is of importance. Alluding to an expedition to purchase corn from the savages in November or December, 1622, he says: "When they came thither they found a great sickness to be among the Indians, not unlike the plague if not the same." And again in January, 1623: "That (corn) from Namasket (now Middleboro) was brought home partly by Indian women; but a great sickness arising amongst them, our own men were enforced to fetch home the rest." [21] These references have been considered by Dr. Green [22] to indicate that the epidemic which had prevailed among the Indians in the four years preceding 1620 had not died out in 1622, two years after the Pilgrims had begun their settlement.

The present writer's interpretation of the paragraphs quoted from Winslow would be that Mr. Winslow himself was not certain whether or not the great sickness that they saw among the Indians in 1622 was the same as the epidemic or "plague" that had reigned among the savages a little earlier. However that may be, Winslow gives no description of the sickness

[15] Not to confuse them with the Plymouth Company in England, they may be called by the well-known name, "Pilgrims."

[16] The so-called Mourt's Relation, Mass. Hist. Soc. Coll., Series 1, Vol. VIII, p. 203.

[17] Page 63.

[18] Morton, New England Canaan, Book 2, Chapter 3, p. 132, Prince Society Publications, edited by Charles Francis Adams, 1883.

[19] Winslow, Good News from New England, Mass. Hist. Soc. Coll., Series I, Vol. VIII, p. 239.

[20] One of the Indians.

[21] Winslow, Good News from New England, Mass. Hist. Soc. Coll., Series 1, Vol. VIII, p. 239.

[22] Green, Samuel A., History of Medicine in Massachusetts.

prevalent during his own time that affords the slightest clue as to its nature. No mention of the occurrence appears in the writings of three other members of the Pilgrim colony, namely, Bradford, Nathaniel Morton and Cushman.

Thomas Morton, who was personally familiar with the colony, says: "This mortality was not ended when the Brownists of new Plimmouth were settled at Patuxet: and by all likelyhood the sicknesse that these Indians died of was the Plague, as by conference with them since my arrivall and habitation in those partes I have learned."[23]

Phinehas Pratt, who, when an old man, wrote down the story of his early adventures, was one of the planters at Weymouth, Massachusetts,[24] 1622. Pratt says: "Then we maed hast to settle our plantation in the Masachusets bay—our Number being neare sixty men. Att the same time ther was a great plag Among the salvagis, &, as ym selfs told vs half thayr people died thereof."

References in Bradford's History to an epidemic among the colonists in 1633, called "an infectious fever" (of which Dr. Samuel Fuller died), have led Mr. Charles Francis Adams to count the same as part of the original epidemic of the Indians, although an interval of more than ten years had elapsed.[25] It seems to the present writer not clear that Bradford himself thought there was any connection between them. Bradford is also noncommittal as to the nature of "a great sickness and mortality" suffered by the Indians on the Connecticut River in 1633-1634, which he mentions, although he is careful to speak of a visitation of small-pox among them as a separate matter.[26]

Tradition Accounting for Origin of Epidemic.

Captain Thomas Dermer, referred to above, mentions that he redeemed two Frenchmen who had been held as captives by the Indians for three years (*i. e.*, since 1616). From other sources we learn that these were the survivors of a larger number of shipwrecked French sailors. A curious and pathetic tradition arose which connected the French prisoners with the epidemic among the Indians which appeared about that time. None of the English that were possible eyewitnesses of the epidemic allude to this story. It seems to have been printed first in a book by Captain John Smith, published in 1631.[27] It is also related by Thomas Morton, Nathaniel Morton, by that learned clergyman, the Reverend Cotton Mather, and in an unsigned document in the Public Record office in London. Their versions differ considerably in details, which are, however, of no great importance from the point of view of this paper. The quotation from Mather,[28] which follows, will also serve to show how interest in this epidemic persisted among the Puritans long after the colonies were firmly established. Referring to the settlement of Plymouth he says:

> The Indians in those parts had newly, even about a year or two before, been visited with such a prodigious pestilence, as carried away not a *tenth*, but *nine* parts of *ten* (yea, 'tis said, *nineteen* of *twenty*) among them: so that the woods were almost cleared of those pernicious creatures, to make room for a better *growth*. It is remarkable that a Frenchman who, not long before these transactions, had by a shipwreck been made a captive amongst the Indians of this country, did, as the survivors reported, just before he dyed in their hands, tell those *tawny pagans*, "that God being angry with them for their wickedness, would not only destroy them all, but also people the place with another nation, which would not live after their brutish manners." Those infidels then blasphemously replyed, "God could not kill them"; which blasphemous mistake was confuted by an horrible and unusual *plague*, whereby they were consumed in such vast multitudes that our first planters found the land almost covered with their unburied carcases; and they that were left alive were smitten into awful and humble regards of the English, by the terrors which the remembrance of the Frenchman's prophesie had imprinted on them.

Nathaniel Morton states that the story of the Frenchman was related to the Pilgrims by the Indians.[29] It may also have been reported to Captain Dermer by the Frenchmen whom he rescued from captivity. It is just possible that we have in this curious legend a vague appreciation of the significance of what may have been an actual occurrence, namely, that some of the French sailors may have brought with them the germs of the unknown epidemic disease and that the Indians derived it from them. Knowing what we now do of so-called "carriers" of pathogenic bacteria, that seems not impossible.[30]

Sources of Information.

The citations given above comprise all the facts that the present writer has been able to discover concerning this epidemic, with a few exceptions which will be given below. Although there are numerous other acounts of it or allusions to it, they give no additional information.[31] In all, it has been possible to find twenty-three different writers that refer to or describe it in books, tracts or letters between 1619 and 1677 (excepting Cotton Mather's Magnalia which appeared in

[23] Morton, New English Canaan, Book 2, Chapter 3, Prince Society's Publications.

[24] The Weymouth settlement was the private enterprise of a certain Mr. Weston. See Mass. Hist. Soc. Coll., Series 4, Vol. IV, p. 479.

[25] Charles Francis Adams, editor of Prince Society's Edition of Morton's New English Canaan, note to p. 133; also Three Episodes of Massachusetts History, p. 2.

[26] Bradford, History of Plymouth Plantation, pp. 197, 198, 203.

[27] Advertisement for the Unexperienced or the Pathway to Erect a Plantation, Mass. Hist. Soc. Coll., Series 3, Vol. III, p. 16.

[28] Cotton Mather, Magnalia Christi Americana, Vol. I, Book I, Chapter II.

[29] The writer of the narrative in the Public Record office in London states that he obtained his knowledge from Mr. Oldham (one of the Plymouth colonists who visited England). Smith might have learned it from the same source.

[30] Phinehas Pratt, in his narrative (Mass. Hist. Soc. Coll., Series 4, Vol. IV, p. 479), tells the story of the shipwrecked Frenchmen as it was related to him by one of the Indians. Pratt's account does not connect the Frenchmen with the pestilence, but simply affirms that the captive sailor prophesied that a people like the French would drive the Indians out of the land.

[31] An analysis of the original documents for this period of American history will be found in Justin Winsor's Narrative and Critical History. See also Winsor's essay on The Earliest Printed Sources of New England History, Proceedings Mass. Hist. Soc. Coll., Series 2, Vol. IX, p. 181.

1702). As this study has been made by one without experience in historical research, it is not unlikely that other references exist, which have been overlooked; but it is hoped that nothing essential has escaped notice. Several of the references found are of the nature of merest allusions. The authorities are enumerated at the end of this paper. All of them (except Cotton Mather) were, if not eyewitnesses, at least in a position to have talked with those who had been eyewitnesses of the progress of the pestilence or its effects. This does not include the early historians, Hubbard, Prince and Hutchinson, who appear to have had no sources of information that are not accessible at the present day. Although it seems not certain that any Englishman actually saw the progress of the disease except the party of Vines, it is not unlikely that Dermer, the Pilgrims and Weston's men (Phinehas Pratt) were eyewitnesses of it to a certain extent.

SUMMARY.

The facts obtained from the various sources already mentioned may now be summarized and analyzed.

DATE OF EPIDEMIC.

An epidemic among the Indians of New England appears to have been reported first by the Vines expedition, for which the date usually assigned is 1616-1617. It is, of course, possible that the epidemic had been in progress for some time before Vines came to America without having attained such proportions as to attract attention. It seems to have continued till 1619 (Dermer), and possibly had not died out entirely as late as 1622 (Winslow, Pratt, Thomas Morton). All the early writers agree substantially that it prevailed during about the period named, except Gookin (writing in 1674), who asserts that it occurred in 1612-1613.

EXTENT.

Roughly speaking, the epidemic appears to have affected the tribes along the coast from Cape Cod to the Penobscot River. Winslow and several others state particularly that the Narragansett Indians remained exempt from it. Johnson seems to be the only authority for supposing that it reached the Pequots.

The tribes of the region afflicted were the Wampanoags, the Massachusetts, the Pawtuckets and the Abnakis, though it must be remembered that tribal divisions were loose and the statements of the early writers confusing. The limit which the disease reached on the east is not so definitely known as that on the west, because contemporaneous observations from Maine are lacking. The Pilgrims (Winslow and Bradford) refer to the absence of natives on the islands in Boston harbor, all being dead. Christopher Levett, who visited the coast of Maine in 1623-1624, speaks[32] of much excellent cleared land, near what is now York, Maine, "having been planted by the savages who are all dead." The party of Vines is supposed to have been still farther east on the Saco River. Statements of Smith[33] and others indicate that the Indian population was largely destroyed as far as the neighborhood of the Penobscot River. The early writers assumed that one great epidemic occurred over all the region named, and there is no reason to think that their supposition was not correct. Sir William Alexander's description of Nova Scotia in 1623 does not refer to any pestilence among the Indians of that region, but his account is too brief to be of much value.[34]

Mr. Francis Parkman, in his "Jesuits in North America,"[35] makes the following reference to an epidemic among the Huron Indians in Ontario, about 1633 and 1634: "A pestilence, similar to that which a few years before had swept off the native populations of New England, had begun its ravages among them." Parkman makes other references to what was apparently the same epidemic. He also mentions that it returned in 1636 and 1637 with great violence, and that small-pox appeared soon after. Whether or not Parkman intended to convey the idea that the pestilence of the Hurons was identical with that of the Indians of New England is not quite clear. His principal sources of information seem to have been the Jesuit Relations. As far as the writer has been able to discover, there is no allusion in these Relations to the New England epidemic. The succession of events connected with the epidemics was somewhat similar in the two cases, and, we presume, led to the use by Parkman of the word similar. There appears to be no reason for supposing that the two epidemics were identical. It is possible but not probable that they were in some way connected.[36]

MORTALITY.

The early accounts agree that the mortality was appalling. When they attempt to express the result in figures, probably the figures have no great value. Edward Johnson says that the Massachusetts tribe was reduced from 30,000 to 300 persons. The latter figure may be approximately correct, as Johnson was in a position to estimate the number of living Indians, but that the Massachusetts ever numbered anything like 30,000 may be doubted. And though we may hesitate to assent wholly to the statement made in the tract called The Planters Plea that "such a plague hath not been known or remembered in any age or part," at least we can agree with honest John Smith that "it is most certain there was an exceeding great plague amongst them."

[32] Levett, A Voyage into New England, etc., Mass. Hist. Soc. Coll., Series 3, Vol. VIII, p. 165.

[33] Smith, New England's Trials, 1622.

[34] Encouragement to Colonies, London, 1624. Prince Society's Publications.

[35] Thirtieth edition, p. 52. Little, Brown & Co., 1892.

[36] Of the disease which afflicted the Hurons, Brébeuf wrote: "This sickness began with a violent fever, which was followed by a sort of measles or small-pox, different, however, from that common in France, accompanied in several cases by blindness for some days, or by dimness of sight, and terminated at length by diarrhœa, which has carried off many and is still bringing some to the grave." Letter of Brébeuf in Le Jeunes' Relation for 1635. Jesuit Relations, etc., ed. Reuben Gold Thwaites, Burrows Brothers, 1897, Vol. VIII, p. 89. See also Vol. XI, p. 13, and Vols. XIII, XIV and XIX, p. 89.

Nature of the Epidemic.

From the pitiably meager descriptions of the epidemic, it is hardly safe to offer a conjecture as to its nature. One notes first the striking immunity of the English from the disease, remarked by the Vines party and referred to by others.[37] This of course suggests that it was some common malady, like small-pox, typhus or measles, from which the English had acquired immunity by having already had it at home.

If the disease was bubonic plague, the English might have appeared to be relatively immune on acount of being better shod and clad, and cleaner than the savages, and, therefore, less liable to small wounds and insect bites, through which the bacilli could be introduced. This is said to be one of the reasons why the English in Hindustan to-day suffer less from bubonic plague than the natives. But it must be remembered that Europeans of the seventeenth century were not so far from savages in their personal habits as are Europeans of the twentieth century.

Gookin, writing in 1674, says: "I have discoursed with old Indians, who were then youths, who say that the bodies all over were exceeding yellow, describing it by a yellow garment they showed me, both before they died and afterwards." From this statement Noah Webster[38] concluded that the pestilence was yellow fever; Hirsch,[39] however, considers that improbable. It is certainly not very powerful evidence.[40] If, as Dr. Green believes, the "great sickness" among the Indians reported by Winslow for November or December, 1622, was the same as the great epidemic of the years preceding, that would be an argument against the yellow fever theory; for yellow fever would not be likely to occur so late in the season. Mr. J. H. Trumbull states that the name of the Indians for the plague, translated literally, meant "a bad yellowing" or "being badly yellow." Small-pox was known by a different word.[41]

It will be remembered that Dermer wrote that he saw the sores of some Indians that had recovered from the epidemic who described the spots of such as usually died. Largely on the strength of this statement, Dr. Oliver Wendell Holmes and Dr. Samuel A. Green[42] came to the conclusion that the epidemic was probably small-pox. There is abundant testimony to show that the Indians in various parts of America have sustained at times a shocking mortality from small-pox. It has been one of the chief causes of the decline of their race. But the same phenomenon has been observed in the case of other diseases new to the Indians, and has been noted in many parts of the world where new infections have been introduced. Also it must not be forgotten that in those days mortalities in Europe were often very high when pestilences prevailed.

The immunity of the English in New England from the epidemic at the time when the Indians were having it would fit in better with the theory that the disease was small-pox or some other exanthem than with any other. But the very fact that the English were likely to be immune from small-pox by having had the disease creates a presumption that they were familiar with small-pox. In that case, we should expect, as Mr. Charles Francis Adams very justly observes,[43] that they would call the epidemic among the Indians "small-pox," and *not* by some other name. It is true that in one old tract[44] the following passage occurs: "Thus farre hath the good hand of God favoured our beginnings . . . . In sweeping away great multitudes of the natives by the small-pox, a little before we went thither, that he might make room for us there." The passage has little to do with the remainder of the tract which deals chiefly with Harvard College. It is likely that the writer of the tract confused the earlier epidemic with undoubted and very terrible outbreaks of small-pox among the Indians which occurred after the colonists arrived, as in 1633. Bradford, Nathaniel Morton and Josselyn particularly refer to small-pox among the Indians as a disease separate from the earlier epidemic or "plague" among the Indians. The Rev. John Eliot, "apostle" to the Indians, spoke of them as "being but a remnant, the Lord using to show mercy to the remnant; for there be but few that are left alive from the Plague and Pox, which God sent into those parts."[45] Remarks made by Roger Williams indicate that the Indians themselves recognized a difference between the plague and small-pox.[46]

The names given to the epidemic by the original writers are various, usually either *the* plague, a plague or a mortality. In no case is it called small-pox, with the possible exception mentioned above. The most definite designation it receives is that of *the* plague, which is frequently used by the writers as though that were a perfectly-well-known affection. The expression "*the* plague" occurs in twelve of the twenty-three original records. With few exceptions the writers were born in Europe, and were no doubt familiar with both bubonic plague and small-pox by reputation and often through experience. During the seventeenth century there were numerous very destructive plagues in England,[47] some of which were undoubtedly bubonic

[37] Captain John Smith, Advertisement for the Unexperienced, etc., Mass. Hist. Soc. Coll., Series 3, Vol. III, p. 16. The Planter's Plea, Colonial Tracts, No. 3, July, 1898.

[38] A Brief History of Epidemic and Pestilential Diseases, Vol. I, p. 281.

[39] Handbook of Historical and Geographical Pathology, Transactions New Sydenham Society, Vol. I, p. 317.

[40] The Collections of the Massachusetts Historical Society have two notes referring to the frequent occurrence of yellow fever among the Indians, especially on Martha's Vineyard, Series 1, Vol. I, p. 140; Series 2, Vol. III, p. 91. The authors are not named and how much weight should be given them is not clear.

[41] Letters of J. H. Trumbull in the appendix to Dr. Green's History of Medicine in Massachusetts.

[42] Holmes, in Lowell Institute Lectures on Massachusetts and its Early History, published by the Massachusetts Historical Society, 1869. Green, History of Medicine in Massachusetts.

[43] Charles Francis Adams, editor of Prince Society's Edition of Thomas Morton's New English Canaan; also Three Episodes of Massachusetts History, p. 3.

[44] New England First Fruits, 1643, Mass. Hist. Soc. Coll., Series 1, Vol. I, p. 242.

[45] John Eliot, The Daybreaking of the Gospel with the Indians, 1647, Old South Leaflets, VI.

[46] Roger Williams, Letters to John Winthrop, June, 1638. Old South Leaflets, III. See also J. H. Trumbull in the appendix to Dr. Green's History of Medicine in Massachusetts.

[47] Payne, in the Encyclopedia Brittanica, enumerates five plagues from 1603 to 1665. Simpson, in his treatise on plague, quotes

plague. In 1665 occurred the great plague of London, which was bubonic plague beyond question. Contemporaneous English writers such as Evelyn and Pepys called it "the plague," and the same writers speak elsewhere of "the small-pox," with which also they were well acquainted. No doubt the word plague was often used in a general sense, as when our good old friend Mercutio said, "a plague o' both your houses"; and the adjective "plaguey" is still occasionally heard. Nevertheless, it seems probable to the present writer that a majority of the original authorities on the epidemic among the Indians of New England, whether rightly or wrongly, considered that epidemic to be bubonic plague. It is noteworthy that, among the plagues of London during the seventeenth century there was one lasting from 1603 through 1611, while a few deaths from plague were recorded annually for many years afterwards. Remembering that the epidemic among the Indians occurred about 1616 to 1620, it seems quite possible that the germs of "the plague" may have been transferred from England to America.

SOURCE OF THE EPIDEMIC.

There is no evidence in any of the original records to suggest that the epidemic among the Indians was a disease native to the New England coast, but there are several reasons for thinking that it was not. First, may be noted the great susceptibility of the Indians, and second, the immunity of the English. Ample means for the transportation of an infection were present in Indians that had been taken to Europe and afterwards brought back to America, and in the frequent visits of fur traders and fishermen. It is expressly stated by some early writers[48] that previously this plague had been unknown among the Indians.

It is by no means impossible that other records than those now known of the epidemic that has been the subject of the present paper may yet come to light, and furnish details that will determine definitely the nature of the disease. Reports or journals of Richard Vines, if they exist, would probably do so. The faded letters of some humble fisherman or some forgotten trader may well enough be stored away in an English garret and may be found any day by the curious student. It is not unexpected, although disappointing, nevertheless, that, beyond what has been said on the preceding pages, the matter must for the present be left undetermined.

But, as the principal object of this paper has been to discover whether or not the seeds of the disease were probably brought from Europe to America, the result of the research has been on the whole satisfactory. In the writer's opinion, the history of this epidemic opposes no argument to the principle stated in the introduction—that the American continent seems to have been the birthplace of a remarkably small number of the great infectious maladies of the world.

Baldwin Latham to the effect that severe plague epidemics occurred in London in 1603, 1625, 1636 and 1665.

[48] Smith, Advertisement for the Unexperienced, Mass. Hist. Soc. Coll., Series 3, Vol. III, p. 16. Nathaniel Morton, New England's Memorial, ed. 1826, Danforth, Plymouth, p. 42. Increase Mather, Early History of New England, etc., p. 72.

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THE USE OF SILVER WIRE IN OPENING THE KIDNEY.*

PRELIMINARY REPORT.

By Ernest K. Cullen, M. B.,
Assistant Resident Gynecologist, Johns Hopkins Hospital.

AND

Herman F. Derge, M. D.,
Resident House Officer, Johns Hopkins Hospital.

(From the Hunterian Laboratory of the Johns Hopkins University.)

At the suggestion of Mr. Max Brödel, a series of experiments was undertaken to ascertain a method of nephrotomy with a minimal amount of hemorrhage, and to determine the subsequent infarct formation with destruction of kidney parenchyma. As some of the experiments are still in progress, and the histological studies only partially completed, merely a preliminary report of the work will be presented. The individual experiments, together with the resulting infarct formation and destruction of kidney parenchyma, will be considered in a subsequent paper. In this report, we will confine ourselves simply to a brief consideration of the comparative amount of hemorrhage following nephrotomy with the knife and with silver wire.

The researches of Mr. M. Brödel on the anatomical structure and vascularization of the kidney are so well known that little comment is necessary. With his celloidin corrosion specimens, he has beautifully demonstrated the arborescent branching of the renal arteries, and a most casual inspection of these preparations cannot fail to impress one that any method of nephrotomy that would aim to minimize hemorrhage must pay due regard to the character of this branching.

In man and the dog there are, as a rule, two main arterial trunks supplying the kidney, one passing to the anterior, the other to the posterior portion. While studying the tree-like branching of these arterial trunks, the thought occurred: Could it be possible to open the kidney in such a manner as to avoid the two main trunks, and, at the same time, do as little damage as possible to the finer branches?

If it were necessary to pass a wire between two trees the branches of which interlaced, it is obvious that this could be more readily accomplished, and with less damage to the trees, by passing the wire from below upwards than from above downwards. In the upward passage of the wire, the branches would slip aside and the twigs and leaves would be the only structures damaged; whereas, in the downward passage of the wire the less resistant branches would be broken or considerably bruised.

Similarly, were a sharper instrument than the wire used, the same comparative results would be obtained. While all the branches would be severed in its downward passage, a considerable number would undoubtedly escape when the instrument was directed upward.

With these simple facts in mind, it occurred to us that, anatomically, the proper procedure in performing a nephrotomy would be to cut from within outward, and that some blunt instrument which would push the vessels aside would probably give the most satisfactory results.

In order to determine the feasibility of this supposition, a series of nephrotomies was performed on dogs, and the results obtained were very definite and gratifying. A No. iii silver wire was used as the blunt instrument, and proved very satisfactory, its pliability and low tensile strength making it almost impossible to tear any of the larger branches, providing ordinary care was exercised in pulling the wire slowly outward.

Two series of experiments were performed to determine, first, whether the direction of the incision had any appreciable effect on the resulting hemorrhage; that is, whether the hemorrhage would be less if the knife was passed from the region of the kidney pelvis out through the cortex and capsule, than from the capsule into the pelvis; secondly, whether the hemorrhage would be lessened and more readily controlled if a silver wire was used in lieu of the knife in splitting the kidney from within outward.

In the first series of experiments, where the knife alone was used, all the incisions were made in a plane at right angles to the curved vertical axis of the kidney. Two incisions were made in each experiment, one by passing the knife from cortex to pelvis, and the other by transfixing the kidney in anterior-posterior manner close to the pelvis, and bringing the knife out through the cortex. Both of these incisions were made at a level of about 2 cm. from either pole and carried through the center of the lobule situated between the central and upper or lower polar lobule.

In each instance, irrespective of whether the incision from pelvis to cortex was placed near the upper or lower pole, the hemorrhage was appreciably less when the knife was directed from pelvis to cortex than from cortex to pelvis. Unfortunately, however, accurate measurements of the amount of blood lost in a given interval of time were made in only one of the experiments of this series.

In this experiment, the incision near the upper pole was made from within out, and 11 cc. of blood were lost in 20 seconds. From an incision near the lower pole, similar in extent and depth, but differing in that the knife was carried from without in, 16.5 cc. of blood were obtained in the same interval of time.

* Demonstrated before the Interurban Surgical Society, April, 1909.

In the second series of experiments, both the knife and silver wire were used, and the experiments divided into two separate groups:

(1) Those in which the incisions were made in planes at right angles to the curved vertical axis of the kidney.

(2) Those in which the kidney was split from pole to pole in a plane parallel with the sagittal plane of the kidney.

In the first group, the knife was used in making the incision near one pole and the silver wire near the other pole. The silver wire was usually employed first. A No. iii or No. iv silver wire threaded on a Kousnietzoff-Cullen straight liver needle was passed transversely through the kidney at the upper level of the pelvis. The capsule was then nicked with a knife from the point of entrance of the wire around to the point of exit. This procedure was found necessary to avoid troublesome bleeding from the tearing of the capsule. With the kidney firmly held in the hand of the assistant, the wire was readily brought out through the cortex by a gentle see-saw motion.

Too much emphasis cannot be placed upon the necessity of firm counter traction on the kidney as the wire is being brought to the surface, as sudden or too violent traction might result in the tearing of the renal vessels.

On examination, the cut surfaces appeared almost as clean-cut as if a knife had been used. The amount of hemorrhage in a given time of 20 seconds was then accurately measured. The cut surfaces were next approximated, and, in several instances, the bleeding, which was only a slight venous ooze, was so slight that a mere approximation of the two surfaces checked all bleeding, and had it been possible to keep the surfaces pressed closely together the kidney could have been safely dropped back into position without a single suture being necessary.

At the suggestion of Dr. Harvey Cushing, superficial mattress sutures of fine black silk were employed in place of deep catgut sutures, which occasionally included one of the larger renal arterial branches, leading to a considerable infarct formation, an accident which, as can be readily seen, would make it impossible to determine just how much of the infarct formation could be ascribed to the effect of the incision, and how much to the disturbance of the blood-supply caused by the offending suture. This disturbing factor was only encountered when the incision was made with the knife from cortex to pelvis, and though the hemorrhage was only partially controlled by the superficial mattress sutures, a considerable hematoma usually formed between the cut surfaces. This type of closure was employed in all our nephrotomies. On the other hand, the ease with which all hemorrhage was controlled by these superficial silk sutures, which included only a small portion of the capsule and kidney cortex when the nephrotomy was performed with the wire, was very striking.

The results obtained in this group of experiments were very satisfactory. Examination of the cut surfaces where the knife was employed showed free hemorrhage, with some actively spurting arteries. On the other hand, the surfaces cut by the wire presented quite a different picture. There was a rather free venous oozing, but only occasionally was an actively spurting artery observed. In the first instance, pressure on the renal artery was necessary to allay the hemorrhage; whereas, in the second instance, there was a gradual abating of the bleeding, and, in some cases, the bleeding ceased entirely at the end of two or three minutes. The amount of blood lost in those experiments where the wire was used varied from one-ninth to one-half the amount lost when the incisions were made with the knife.

In the second group of this series of experiments, the kidney was split open from pole to pole and the pelvis of the kidney widely opened. This was accomplished in some cases by incising with the knife from cortex to pelvis, and in the other cases by drawing the silver wire from the pelvis of the kidney out through the cortex.

In the latter instance, the method of procedure was as follows: A No. iv silver wire, threaded on a straight liver needle, was passed through the kidney from pole to pole, no particular effort being made to enter or avoid entering the pelvis of the kidney, for the reason that if, after drawing the wire out through the cortex, it was found that the pelvis had not been opened, it was a simple matter to pass the needle and wire through the pelvis and, with a see-saw motion, pull the wire through the wall of the pelvis, and thus widely open the pelvis. The danger of piercing or seriously injuring any of the large branches of the renal vessels in the region of the pelvis is minimal, providing the needle is pushed slowly through the kidney parenchyma, and is slightly deflected whenever it encounters any resisting structures. Sometimes, when the needle impinges against the wall of the pelvis of the kidney, one hesitates to push the needle any farther, fearing lest it may be one of the large renal vessels. Under such circumstances, a little reconnoitering with the blunted end of the liver needle will usually dispel the doubt. If it is the wall of the pelvis that is the barrier, a slight deflection of the needle in any direction will fail to free the end of the needle; whereas, if it is a vessel, the same maneuver will cause the needle to slip by readily.

In none of our experiments have we had the least trouble from any hemorrhage by transfixing the kidney in this manner, and with only one or two exceptions, the needle and wire were always passed through the pelvis.

With the wire in position, the next step in the operation was to split the capsule of the kidney in a line joining the points of entrance and emergence of the wire. The reason for this has previously been mentioned. This preliminary procedure finished, the wire was drawn up through the cortex with a gentle sawing motion, much as one uses a Gigli saw in cutting the bones of the cranial vault, preparatory to doing a "bone-flap" operation. The ease with which the kidney could be split by this method was surprising, the wire passing very readily through the parenchyma.

Whenever the wire encountered any of the more resistant structures, such as the blood-vessels, the fact was at once evident to the operator, and it was only necessary to deflect the wire a trifle to avoid injuring the same. No special effort

was made to direct the wire, except to bring it out somewhere near the median sagittal plane of the kidney. By allowing the wire to follow in the plane of least resistance, the kidney was invariably split in the avascular zone or Brödel's line, and with a comparatively insignificant amount of hemorrhage. Only rarely was a small spurting vessel observed, even though no effort was made to control hemorrhage by pressure upon the renal vessels; a pictue in marked contrast to that presented when the kidney was similarly opened by cutting with the knife from cortex to pelvis. As a rule, the hemorrhage was merely a free venous oozing, which frequently was entirely controlled by pressing hot sponges (110° F.) against the cut surfaces for several minutes.

How insignificant the hemorrhage may be was well illustrated in one experiment where, after the kidney had been split from pole to pole and the pelvis opened, it was left undisturbed outside of the body of the animal while the other kidney was being operated upon. Though the renal vessels at the hilus of the kidney were not compressed in the least, and the kidney, pulsating synchronously with every heartbeat, was laid open like an open book, there was practically no bleeding from the cut surfaces several minutes after the incision had been made.

With one or two exceptions, a mere approximation of the cut surfaces controlled all hemorrhage. However, before replacing the kidney, a number of fine black silk sutures, including only the capsule and a small portion of the cortex, were used to maintain the approximation rather than to control hemorrhage.

Comparative measurements of the amount of blood lost in twenty seconds, showed that from one-eighth to one-fourth less blood was lost than when the nephrotomy was performed with the knife. From what has been said before, one would imagine that the hemorrhage when the silver wire was used should have been considerably less than our measurements indicated, but the reason for this apparent discrepancy is readily apparent. Our measurements of the amount of hemorrhage were all taken immediately after the incision had been made, at a time when there was a free venous oozing, and had it been possible to measure the amount of hemorrhage for a longer interval of time—two to three minutes—the difference would have been most pronounced. All the animals upon which the nephrotomy was performed with the wire could have withstood this prolonged bleeding test without any danger of bleeding to death, for in these the bleeding became progressively less.

On the other hand, few, if any, of the animals could have recovered such a test when the knife was used. It is emphasized, therefore, that the value of the silver wire method of nephrotomy lies more in the rapidity with which the hemorrhage abates, and the ease with which it can be controlled, than in the actual amount of blood lost in a given interval of time.

As yet, we have had little opportunity of applying this method of nephrotomy in the operating room. Several months ago, Dr. Thomas S. Cullen kindly consented to use the wire in a case of nephrolithiasis. Nephrotomy was performed and the wire proved most satisfactory. Since then, nephrotomy with the silver wire has been performed in three cases in Dr. W. S. Halsted's surgical clinic of the Johns Hopkins Hospital by Dr. Hugh H. Young and Dr. Charles Remsen, with satisfactory results.

In operating upon the human kidney a large curved liver needle is often preferable to a straight one. If the kidney is unusually large the splitting may be performed in two stages, each polar half being split separately.

This report, as was stated, is merely preliminary, and the individual experiments, together with the histological findings, will be considered in detail in a subsequent paper.

We are greatly indebted to Mr. Brödel, who has advised and directed us in our experiments. Dr. Harvey Cushing has aided us in many ways and has given valuable suggestions. We wish also to express our thanks to Dr. S. J. Crowe of the Hunterian laboratory for his courtesy and assistance.

NOTES ON NEW BOOKS.

The Principles and Practice of Medicine. Designed for the Use of Practitioners and Students of Medicine. By WILLIAM OSLER, M. D., F. R. S., F. R. C. P., Regius Professor of Medicine, Oxford University, Honorary Professor of Medicine, Johns Hopkins University, Baltimore. Seventh edition. (*D. Appleton & Co., 1909.*)

The appearance of the seventh edition of this well-known textbook scarce needs words of commendation. The fame of its author, his keen insight into both the clinical and the laboratory sides of internal medicine has made this book the standard throughout the English-speaking world.

We take pride in hearing that French and German editions have already appeared, and Spanish and Chinese translations are in the course of preparation. In view of the extraordinary rapidity of the progress of our knowledge of acute infections, the author has found it necessary to issue the present edition after the short interval of three years.

He has incorporated within a volume of practically the same number of pages as previously all of the more important advances in internal medicine and serum-therapy, and the indications for surgical interference in internal diseases.

The work as a whole shows most careful revision and it will be necessary to mention only a few of the more important changes. Under the section devoted to Diseases Due to Animal Parasites we find reference to the latest work of Schaudinn in distinguishing between the pathogenic and non-pathogenic forms of amœbæ. The results of the new studies in trypanosomiasis, and an entire new symptomatology of the so-called tropical splenomegaly are included. In dealing with the question of prophylaxis in malaria a most generous tribute is paid to the splendid work of Gorgas on the Canal Zone, in the extermination of the "greatest scourges of the race."

Few changes are to be noted in the chapter devoted to typhoid fever. We are struck by the figures, giving the enormous annual sacrifice of human life made to this direful disease. From 35,000 to 40,000 deaths are credited to it annually. In view of the great

number of recent papers and statistics in which a more liberal feeding of typhoid patients is advocated, it is surprising that no changes are found in the paragraphs devoted to the diet in typhoid fever.

The merry war waged between the liberal and the restricted diet factions continues and is far from being settled. Dr. Osler seemingly prefers to adhere to his old belief of a more or less restricted diet.

In accordance with the findings and results of the recent Washington Congress for the Study of Tuberculosis, we find much new matter in the section devoted to that disease. In summing up the discussion as to the relative importance of the various portals of infection, he characteristically says: "The truth is that this ubiquitous bacillus is not particular and gains entrance through many portals—throat, lungs and intestines. The important matter for the individual is the nature of the soil on which it falls."

Again, in closing this chapter, he addresses the general practitioners, as follows: "The battle against this scourge is in your hands. Much has been done, much remains to do. By early diagnosis and prompt, systematic treatment of individual cases, by striving in every possible way to improve the social condition of the poor, by joining actively in the work of the local and national anti-tuberculosis societies you can help in the most important and the most hopeful campaign ever undertaken by the profession."

He mentions the new discoveries and advances in the study of syphilis; the use of serum in the treatment of cerebro-spinal fever; and the fact that new light has been thrown upon the etiology of Malta fever as a result of the British Government Committee's investigations. Two new fevers appear in the list of "Infectious Diseases of Doubtful Nature," namely, Rocky Mountain spotted fever (tick fever) and the swine fever.

In Section IV, on the "Diseases of the Stomach," much new matter has been added to the subject of the site, relative occurrence and question of perforation in peptic ulcers, gastric and duodenal—new figures based upon the report of the Mayo's series of 1908, and Musser's series. The indications for surgical interference are clearly stated.

Even in a casual reading of the section upon "Diseases of the Nervous System," we find many new and interesting facts. The work of Marie and his pupils upon aphasia is emphasized. The subject of psychasthenia receives much deserved attention and with the author's clear and forcible style the reader is made to grasp the essentials of this important malady.

A most striking paragraph is written concerning what the author pleases to designate "the cult of the day—faith healing," in which is exemplified an agent used in all ages, the prayer of faith.

J. S. B.

Therapeutics of the Circulation. By LANDER BRUNTON, Kt., M. D., D. Sc., etc. (*Philadelphia: P. Blakiston's Son & Co., 1908.*) Price $1.50.

The books consists of a series of eight lectures delivered by Sir Lander Brunton in the physiological laboratory of the University of London in 1905. As stated in the preface, the purpose of the lectures as laid down by the university is to present the results of recent investigations by the investigators themselves, orally and with experimental demonstration in the lecture-room, and outside the lecture-room by monographs approved by the university. Such is the nature of the book under review, and at the outset it may be stated that it is in no sense to be regarded as a comprehensive and exhaustive treatise of the subject titled by "Therapeutics of the Circulation." It is, however, a book which is unique in medical literature, for so far as is known to the reviewer, it is the most successful attempt as yet made in manual form to correlate the results of laboratory and experimental work with clinical observation.

The first two lectures and part of the third are devoted to a consideration of the more important physiological facts concerning the heart and blood-vessels. They are stated in a clear and convincing manner and it cannot fail to impress the reader that the writer is a master of his subject. Special stress is laid on those facts which have a direct bearing on treatments, as for example the "Self-massage of the Heart," where it is shown that the nutrition of the heart is dependent to a large extent upon its own activity. The writer also draws attention to many other conditions which are either overlooked or regarding which erroneous impressions are apt to be held. How few medical men grasp the significance of the fact that diastole is the method provided by nature for the "sleep of the heart." It is seldom that one finds in clinical textbooks so lucid an account of the nervous and muscular conduction in the heart. It is a subject which demands ever increasing attention on account of the various disturbances of conduction which are now being recognized clinically. It is, perhaps, in this respect only that the book may be said to be incomplete, for no account is given of the venous pulse from a study of which the various disturbances of conduction can be recognized.

The fourth and fifth lectures give a brief account of the diseases of the circulation and the indications for treatment, while the sixth lecture deals with the various drugs commonly employed in the therapeutics. The seventh and eighth lectures treat of the methods and means at our disposal for combating the disturbances of the circulation in general.

The book is one which ought to find a place in the library of every medical man. It will be especially valuable for the general practitioner who desires to keep abreast of the recent advances in the physiology and therapeutics of the circulatory system.

H. A. S.

Scientific Memoirs—New Series, No. 35. By Officers of the Medical and Sanitary Departments of the Government of India. *Black-Water Fever.* By CAPTAIN S. R. CHRISTOPHERS, M. B., I. M. S., and C. A. BENTLY. (*Printed at the Government Monotype Press, Simla, 1908.*)

This paper is a valuable monograph on an obscure disease by men who are very familiar with the clinical picture of black-water fever in India. It comprises their experience, which is extensive.

In the introduction the authors discuss the various theories concerning this disease.

1. That black-water fever is a pernicious form of malarial attack.

2. That black-water fever is a quinine intoxication.

3. That black-water fever is a distinct disease due to some specific organism.

4. That black-water fever is the result of a condition brought about by repeated malarial infection lasting over a certain time.

Much evidence is brought to show that the geographical distribution of black-water fever corresponds with that of malaria. The clinical picture of the disease is detailed at considerable length. The authors' studies were carried on in the Duars, a district in India where black-water fever is prevalent. Many statistics are brought forward to show that black-water fever appears in regions where the malarial infection is heaviest. This is true in the Duars. The most frequent parasite is the malignant Tertian (Aestivo-Autumnal parasite). The cases are rare in foreigners residing in India less than six months—most frequent in the second and third years of residence. The authors confirm the findings of other writers, that there is no parasite peculiar to this disease. They lay great emphasis on the history of repeated malarial infections as a very important factor in the causation of black-water fever. They look at this disease as a distinct morbid process which is induced by malaria. The urinary findings are reviewed at some length. The blood changes are studied carefully.

They emphasize some early changes in the red blood-cells—the presence of many small, swollen, pale, spherical red blood-cells, "spherocytes." Splenic puncture was a routine procedure. Smears showed malarial pigment as a rule and many "spherocytes." The most unusual thing was phagocytosis of the red blood-cells by large mononuclear cells. Their autopsy material was limited to two cases and was decidedly unsatisfactory.

Chapter II.—A review of the various types of hemoglobinuria.

1. Parasitic—piroplasmosis.
2. Paroxysmal.
3. Burns.
4. Transfusion.
5. Injection of chemicals.

Two types of blood destruction are pointed out:

1. Phagocytosis of damaged but intact red blood-cells.
2. Solution of red blood-cells in plasma.

They find no evidence of alteration in osmotic tension in black-water fever. The relation of corpuscles to plasma is normal. They consider quinine of no etiological importance, but state that some cases may show a true hemoglobinuria following quinine. They think there is good evidence in favor of the theory that in black-water fever some specific hemolysin is present. It cannot be demonstrated in man or in animals. It is due to a condition following repeated attacks of malaria and precipitated by an acute attack. Perhaps due to something which the body produces as a reaction against these repeated attacks (an autolysin?).

Prophylaxis—prevention of malarial infection and prompt quinine treatment.

The bibliography is complete.

Diseases of the Heart. By JAMES MACKENZIE, M. D., M. R. C. P. 385 pages. (*London: Henry Frowde and Hodder & Stoughton, 1908.*) *Oxford Medical Publications.*

In his first book, "The Study of the Pulse and Movements of the Heart" (1903), Mackenzie practically created the epoch of physiological analysis in the clinical study of the diseased heart. With the application of a simplified technique for obtaining simultaneous tracings from the veins, apex and arteries, he was a worthy successor to Marey and Francois-Franck in enabling the clinician to study the patient's heart, as Engelmann had studied the frog's heart, from the standpoints of rhythmicity, irritability, conductivity and contractility. The book contained a vast number of valuable and interesting suggestions deduced from his physiological analyses, arranged in accordance with its bearing upon disturbances of function regardless of the associated lesion. Not the least important feature was the length of time over which his observations extended, many over ten years duration, permitting a completeness of view that had never been equaled.

The book upon diseases of the heart is based upon a far larger experience added in the five years that have elapsed, during which Mackenzie's graphic methods have come into general use. It can thus be safely said to be founded upon a larger clinical material than has ever before been studied physiologically. In this work Mackenzie has aimed "to ascertain the mechanism by which symptoms are produced, to find out their relationship to organic changes in the heart, to ascertain their prognostic significance, and finally to employ them as a guide for treatment." If the writer intends the book for the use of the general practitioner, as he insinuates, he would be unjust to himself. The tone of the book, as he admits in the preface, is controversial rather than judicial, intended to convince the medical public of the practical use to which the study of venous tracings can be put, and also to substantiate the theoretical explanations which have been advanced by the author. Accordingly, one who is not already familiar with these phases of the subject, though deriving a wealth of information, would see but one side of many controversies. The fact that a good bibliography is given at the back of the book does not make up for the lack of discussion in the text. In accordance with this principle, which is quite justifiable in a brief work if admittedly controversial, the writer has introduced a good many rather dogmatic groupings of clinical conditions, especially in regard to the alterations of rhythm.

The writer designates as sinus irregularities those arrhythmias, neurogenic or myogenic, in which the venous tracings show that the auricles take part in the arrhythmia; and as nodal irregularities those in which no wave due to auricular contraction can be seen. He assumes that the rhythm here begins in the Purkinje cells of His' bundle at Tawara's nodal point (Knotenpunkt) in the interauricular septum. In the present state of our knowlege one may well hesitate to accept this interpretation, especially since Retzer's anatomical studies indicate that Tawara's nodal point, if it have any structural existence at all, lies within the sinus portion of the auricle. Even in the absence of these studies the classification and grouping is based upon much that is hypothetical.

The all-pervading doctrine that the Purkinje cells initiate many forms of cardiac rhythm, though probable in many cases, is also still hypothetical, and might well be treated with some reservations. Instances like the above are numerous; but, representing the author's views, ingenious and plausible even if not strictly proved, they may be read, in a judicial attitude, with interest and profit.

The book is confined to one phase of the question in cardiac disease. Studies by methods other than those of the venous pulse—the older questions of physical diagnosis on the one hand, and the newer questions of X-ray studies, electrocardiograms and electrophonograms receive practically no discussion. The author alludes to determinations of blood pressures (maximal pressure only), but has made no adequate use of the information obtainable by this means. Congenital heart diseases are mentioned in one page, the heart of Basedow's disease in three scattered paragraphs.

On the other hand, the chapters are brief and the statements are made rather dogmatically without putting the reader into a position to weigh the evidence upon which they are founded. One particularly misses detail in the discussion of the extrasystolic irregularities, in which the writer is rather noncommittal. This cannot fail to be a source of regret. The life-work of a master cannot be compressed into a few pages, and detailed discussions based upon his thousands of careful studies would be gratefully welcomed. Moreover, they would serve as a lesson to show how one man has availed himself of the wealth of material for research that falls to the lot of every busy practitioner.

Treatment also is not discussed with any degree of completeness, but only in its bearing upon the one phase in which the author is interested. The intravenous use of strophanthin and numerous other important modes of treatment are not mentioned. Brauer's cardiolysis for the relief of adherent pericardium receives one line. Paracentesis pericardii is not mentioned, and the writer states that he has "never found any very serious embarrassment of the circulation from extensive pericardial effusion" (!)—a fact at variance with universal experience and experiment.

However, like many dishes which must be taken with a few grains of salt, the book contains much that can be ruminated on long and carefully and that will contribute to the mental growth of the reader.

The Harvey Lectures. Delivered under the auspices of the Harvey Society of New York, 1906-1907. (*Philadelphia and London: J. B. Lippincott Company, 1908.*)

The Harvey Society is performing a very real service for the profession. The present volume marks the completion of its sec-

ond year and fully maintains the high standard set during the first year of the existence of the society.

The lecturers in the second course included Drs. Wright, Herter, Porter, Adami, Meltzer, Benedict, Wilson, Huntington, Councilman and Müller, a list of names which does honor to the selective judgment of the officers of the society.

The first of the series of lectures was delivered by Sir Almroth E. Wright, of London, and was devoted to a consideration of the principles of vaccine therapy. No subject perhaps has been more interesting to the profession at large during the past few years than the attempt at adaptation for therapeutic uses of the protective mechanisms which bacteriologists have shown us are called into play in the animal organism during the processes of immunization. Dr. Wright reviewed existing knowledge concerning the activity of leucocytes and of the various anti-bacterial substances in the body fluids in these protective processes.

It was natural that he should pay especial attention to the opsonins inasmuch as these substances are the particular bacteriotropic elements toward which his own researches have been especially directed. His studies and those of his pupils have led him to believe that the determination of the so-called opsonic index by his method is the best means we have of measuring the immunizing effect produced by the inoculation of bacterial vaccines. While many workers on immunity problems believe Sir Almroth Wright's enthusiasm has gone somewhat beyond the mark, all must be grateful for his clear and concise presentation of his views as summarized in this lecture. Just now there is a pronounced reaction among clinicians as regards the use of opsonic methods, a reaction which perhaps could have been prophesied at the time of their very enthusiastic exploitation. The danger is that this reaction will go too far and that young clinical investigators will be deterred from study in a field which is certainly of great scientific importance, even if the clinical application of the results has been somewhat premature.

The title of the second Harvey Lecture, given by Dr. C. A. Herter, of New York, is "The Common Bacteriological Infections of the Digestive Tract and the Intoxications Arising Therefrom." The well-known researches of this author upon the bacterial flora of the digestive tract at various stages of life in health and in disease have led him to form some interesting conceptions regarding the pathogeny of certain diseases of digestion, of the blood, of the joints and of the nervous system. His studies have included a careful analysis of the chemical products of intestinal fermentation and putrefaction, and it is with the relation of these various products to certain clinical types of disease depending upon individual susceptibilities and reactions that the lecturer chiefly deals. The limits of this review do not permit us to do more than mention his three main types of chronic excessive intestinal putrefaction; namely, the indolic type, the saccharo-butyric type and the combined type. In the indolic type members of the colon group appear to be responsible. In the saccharo-butyric type Herter believes that the *Bacillus aerogenes capsulatus* is the main enemy, while in the combined type, presumably due to both forms of intestinal putrefaction, there is a profound disturbance of the bacterial processes in the gut leading finally to pernicious anæmia, to melancholia and to other serious disorders. The lecture closes with brief directions as to the therapeutic management of these different types of intestinal disease.

The professor of comparative physiology in Harvard University, Dr. Porter, delivered the third lecture and chose as his subject "Vasomotor Relations." This lecture deals with phases of the circulatory function which are far too little thought about by practitioners of medicine. In the first part of his lecture the speaker dealt with the relations of the vasomotor nerve cells to shock. His experiments have shown that the vasomotor cells retain their irritability in spite of the extensive injury of peripheral organs and tissues, and furthermore that stimulation of foreign nerve trunks has only a momentary effect upon the general blood pressure. He lays great stress upon the relative or percental change in blood pressure, since he regards this as the true index of the condition of the vasomotor cells and he finds that it increases as the blood pressure falls.

Porter draws a clear distinction between the symptoms of shock and shock itself. With the former, clinicians are well acquainted, but the explanations of the latter are as yet purely hypothetical. The lecturer maintained that the hypothesis usually put forward declaring that the vasomotor cells are depressed, exhausted or inhibited by excessive stimulation of afferent nerves is untrue and it must be admitted that his experiments seem conclusive.

The studies of vasomotor phenomena are much complicated by the fact that the vasomotor system is composed of at least three separate superimposed series of neurones, one in the medulla oblongata, a second in the medulla spinalis and a third outside the cerebro-spinal nervous system. Each of these links in the vasomotor neurone-chain has essentially individual functions. These neurones of different order react differently to the same stimulus and there seems to be no doubt now that there are specific differences in these different sets of neurones, a fact which will have to be considered if a therapy of the vasomotor cells ever be established.

Dr. Porter's lecture impresses one with the great complexity of the problems dealing with the peripheral circulation and one leaves the speaker with the conviction that we can scarcely hope to have new knowledge in this field except through the slow answering of single questions under conditions in which the varying factors can be successfully controlled, that is through animal experimentation in the laboratory.

A subject hitherto almost unknown to medical men was dealt with by Dr. Adami under the caption of "The Myelins and Potential Fluid Crystalline Bodies of the Organism." Though physicians are familiar with the microscope, very few of them have had experience with a polarizing apparatus applied thereto. The polarization microscope, however, has proven to be most valuable in the study of myelin droplets and similar substances in the animal body. When myelin from the adrenal or from an atheromatous aorta is examined between crossed Nicol's prisms one sees on the globules an exquisite black cross between four illuminated sectors. Ordinary fat behaves entirely differently.

The fact that myelin is doubly refractive was observed as early as 1862, but was lost sight of until recently. Klotz's studies upon the formation of calcium soaps in the organism led Adami and Aschoff to an examination of the relation of these soaps to myelin bodies. The close relation of simple calcium soaps of oleic acid to myelin was soon established, and further study revealed the fact of the kinship of the myelin bodies to crystals. The physicists have for some time been acquainted with what are now known as fluid crystals, and examination proves that the doubly refractive crystals known as myelin are in reality fluid sphero-crystals. In all probability they are soaps of oleic acid of greater or less complexity, those of them in the nervous system being perhaps combinations of oleic acid with cholin, neurin, cholesterin or lecithin. These studies appear to be of great importance and it seems probable that they will prove to be fundamental not only in histological studies, but also in connection with the problems of the metabolism of fat.

So much has been said and written of late regarding the protein minimum, Fletcherizing and special limited dietaries generally that many will welcome the views advanced by Dr. Meltzer, in his lecture entitled "The Factors of Safety in Animal Structure and Animal Economy," in which more liberal dietaries are not only condoned, but held to be essential for the safe-guarding of the organism.

The volume contains also important addresses by Prof. Benedict on metabolism during inanition, by Prof. Wilson, on recent studies of heredity, by Prof. Huntington on the development of the genito-urinary tract, by Prof. Councilman upon the lymphoid tissue in infections and by Prof. Friedrich Müller on nervous disorders of the heart.

It is probable that this volume will find its way into the library of many progressive physicians.

Graphic Methods in Heart Disease. By JOHN HAY, M. D., M. R. C. P. With an Introduction by JAMES MACKENZIE, M. D., M. R. C. P. (*London: Henry Frowde and Hodder & Stoughton, 1909.*) *Oxford Medical Publications.*

As Hay points out in this volume, the careful clinician of to-day is no longer satisfied with merely recognizing the presence and nature of a cardiac lesion. He tends to lay less stress on the character of the organic lesion and more on the determination of the "area of cardiac response." The important question to decide in any case is, after all, not what the pathological anatomy of the heart is, but what it is doing, and what it is able to do. In the solution of the problem of functional diagnosis, the adoption of graphic methods for registering the movements of auricles and ventricles, as they are evidenced in the arteries and veins, has proved of great value. Within the last few years the new methods have been widely adopted, and they are now recognized as having a very distinct value and interest. While there are many men actively engaged in doing cardiographic work, there is a much larger number, who, unable to take it up practically, desire to get a general idea of the subject. One of the difficulties which has hitherto confronted the beginner in the study of this new field of diagnosis has been the inability to obtain any single article or book which puts the whole subject before him in a simple, comprehensive manner, and within a moderate space. The want of an elementary handbook in the study of graphic methods in heart disease, Dr. Hay has most successfully filled. In small compass, and in a most readable style he has brought together the essentials of the subject so that it is possible for anyone to obtain a good, general understanding of it. For those who desire to go deeper, and to do cardiographic work themselves, the book will serve as a foundation, and will prove of constant value for reference. The first two chapters give some of the more important points in cardiac anatomy and physiology. The third chapter describes some of the commoner forms of instruments. The rest of the volume is taken up with explanations of normal tracings, and of tracings representing the various types of functional disturbance. There are numerous illustrations of excellent cardiographic records. One might, perhaps, desire more references to the works of other authors, but these have evidently been purposely omitted with a view to keeping the book as simple as possible. F. W. P.

Severest Anæmias. Vol. I. By WILLIAM HUNTER. (*London: MacMillan & Co., 1909.*)

This book will be read with great interest by hematologists and clinicians alike who are interested in the large group of diseases comprised under the title anæmia. The special interest centers, of course, in Dr. Hunter's own views as to the so-called progressive pernicious anæmia. He has been an earnest student of the subject for many years and his contributions cover a long period (1885-1909). This first volume is given up to the historical discussion, etiology, pathology and nomenclature of what he says should be called "Addisonian anæmia." The historical section is a very complete review of all the work on this "clinical entity" from Combe (1822) to the present time.

He shows beyond peradventure that the priority for the clinical feature and some of the more important of the pathological findings and the recognition of the disease as *sui generis* belong to the English school, antedating Biermer by many years.

He attacks and shows the inconsistencies in Biermer's and Ehrlich's concepts, and quotes Prof. Gairdner's criticism to the effect that the German tendency to group clinical "casuistic" into conformity with *à priori* laws had led to a confusion of the original idea of Addison. In the sections on etiology and pathology he makes a very strong argument not only for the toxic idea of origin as opposed to any primary bone marrow changes but for the separation of the Addisonian anæmia as a specific infective disease, characterized by (1) glossitis—infection of stomach and intestines; (2) hæmolytic changes (of portal source), specific and characteristic for this form, seen specially in spleen, liver and kidney; (3) bone marrow hyperplastic changes, which are a result of the foregoing and which vary with the degree of the specific and secondary infective processes. The sections, photographs and descriptions of the infective changes in the mouth and stomach are very striking, but will be better considered with the clinical notes in the second volume. Altogether, whether one agrees with Dr. Hunter or not, his presentation of the subject is highly engrossing and it is hard to put the book down unfinished. T. R. B.

Reports of the Sleeping Sickness Commission of the Royal Society. No. IX. Price 1/6. (*London: Darling & Son, 1908.*)

This number of the reports contains five monographs covering the distribution of sleeping sickness in Uganda and the summary of the observed facts with relation to the biology and epidemiology of the disease. There is also a discussion of the prophylaxis and treatment. Three of the papers take up the experimental side, with especial reference to the effect of various drugs on trypanosomiasis in rats. The conclusions are very interesting and may be summed up to the effect that no drug yet thoroughly studied effects a permanent destruction of this infection, but that all cases recover after various intervals of time.

Under certain conditions the trypanosomes may become quite resistant to atoxyl and remain in the circulating blood in spite of large and frequent doses. Sodium antimonyl tartrate, recommended by Aders Plimmer, seems to possess remarkable toxic properties for the trypanosomes without being poisonous to the rats used in experiments. Some rats treated with this drug had remained free from parasites for 152 days at time of publication. Further studies of this drug are promised.

Lastly, there is a full index of the first nine numbers of the reports appended to this number. T. R. B.

A System of Operative Surgery. By Various Authors. Edited by F. F. BURGHARD, M. S. (Lond.), F. R. C. S. (Eng.), Teacher of Operative Surgery in King's College, London. Surgeon to King's College Hospital, etc. In four volumes. (*London: Henry Frowde and Hodder & Stoughton, 1909.*) *Oxford Medical Publications.*

Volume I is divided into nine sections as follows: I, Principles and Technique of Wound Treatment; II, Methods of Local Analgesia; III, Amputations; IV, Operations Upon Arteries, Veins and Lymphatics; V, Operations Upon Nerves; VI, Operations Upon Muscles, Tendons, Tendon Sheaths and Bursæ; VII, Operations for Non-Tuberculous Affections of the Bones; VIII, Operations for Non-Tuberculous Affections of Joints; IX, Plastic Surgery.

The editor in his preface says that in order to present faithfully the present position of British Operative Surgery, the plan has been adapted of securing the co-operation of a number of prominent British surgeons, each writer dealing with a branch of the subject in which he has had special experience.

In the section on the Principles and Technique of Wound Treatment the percentage of suppuration in clean cases operated on in

hospitals is given as a little less than 5.84 per cent. This is a much larger per cent of suppuration than we are accustomed to have in clean cases in our hospitals, where the technique is acknowledged to be of the first class.

There is quite a complete résumé of Barker's work on Local and Spinal Analgesia in which he recommends spinal analgesia to reduce the shock in severe injuries to the lower extremities.

The most complete sections in the book are those written by the editor himself, and they cover the ground thoroughly, although some of the operations generally accepted in this country as the most satisfactory are not mentioned; for example, the suturing of the aponeurosis and periosteum in fracture of the patella instead of wiring the fragments.

The indications for the individual operations are described at length, and the after treatment and results are considered.

The numerous illustrations are clear and descriptive. The index is well arranged, and the book is well printed.

This volume is a good beginning for the system, and promises well for those to come. J. S. D.

Orthopedic Surgery for Practitioners. By HENRY LING TAYLOR, M. D., assisted by CHARLES OGILVY, M. D., and FRED H. ALBEE, M. D., with 254 illustrations. 8 vo. 503 pages. (*D. Appleton & Company, 1909.*)

Dr. Taylor divides his book into general, special and technical parts. In his preface he says that he aims to give an outline of the essential facts in regard to deformities and crippling affections for daily use in general practice, which is a very good statement of what he does. There is certainly no redundancy and no unnecessary lengthy explanations. Most of the work is practical, theoretical discussions and explanations finding small room. The subject is presented in as brief a manner as is possible with clear explanations. The technical part is especially valuable to anyone who has to rely mainly on his own efforts and has not the advantage of hospital conveniences, and also to anyone who has not had the opportunity of much actual experience in the application of plaster splints and the various mechanical appliances which are essential in the work of orthopedic surgery. The illustrations are excellent and for the most part specially taken for this book. Dr. Taylor has had a large experience in this branch of surgery which enables him to write authoritatively. The book is modern and will be found valuable for students and practitioners, but does not excel in any special manner the other standard works on the subject. The author has appended the literature of the subject by modern writers for the convenience of those who desire fuller information on the subject.

HENRY W. KENNARD, M. D.

Appendicitis and Other Diseases of the Vermiform Appendix. By HOWARD A. KELLY, M. D. With 215 original illustrations, some in colors, and three lithographic plates. (*Philadelphia and London: J. B. Lippincott Company, 1909.*)

This work is not intended to replace the larger and more exhaustive first edition on the Vermiform Appendix and Its Diseases, by Kelly and Hurdon. But for the convenience of the busy surgeon the author has culled out of the larger book the essential and more important subject-matter, and has prepared this "compact résumé, dwelling with especial care on the practical side of the subject." The result is a handsome octavo volume of about five hundred pages, in which the author has exhibited admirable judgment and skill in his selective and eliminative treatment of the more pretentious first edition.

One not familiar with the earlier work would be apt to regard this epitomized edition as an exhaustive treatise, since it discusses the appendix from practically every standpoint at sufficient length to leave little to be desired.

As should be the case in a work designed for practical use among surgeons, chief space has been allotted the sections on Anatomy, Pathology, Etiology, Clinical History and Diagnosis, the Operative Treatment and Post-operative Care of the Patient and of Complications. These discussions are very full, comprehensive and clear. Of less practical significance, perhaps, but of absorbing interest, are the brief historical review of appendicitis, and the chapters on Bacteriology, Neoplasms, Specific Infections of the Appendix, the Medico-Legal Aspects of Appendicitis and others. The sections on Appendicitis and Typhoid Fever, Appendicitis in Childhood and Appendicitis in Gynecology and Obstetrics, deserve special emphasis because of the importance of every surgeon familiarizing himself with these associated conditions, now far too often going unrecognized until dangerous or fatal complications arise.

The same magnificent graphic illustrations by Brödel, Miss Huntington (now Mrs. Brödel), Horn and Becker, which, by reason of their superior artistic excellence, placed the former work in a class by itself, are profusely scattered through this new edition and add very materially both to the attractiveness and the worth of the volume.

In a word, the work is an authoritative treatise on the diseases of the vermiform appendix from every point of view, and deserves a place in the library of every practical surgeon. E. H. R.

A Text-Book of Operative Surgery, Covering the Surgical Anatomy and Operative Technic Involved in the Operations of General Surgery. Designed for Practitioners and Students. By WARREN STONE BICKHAM, M. D., Phar. M., Junior Surgeon Touro Hospital, New Orleans, etc. Third edition, greatly enlarged, containing 854 illustrations. Price $6.50. (*Philadelphia and London: W. B. Saunders Company, 1908.*)

The book is divided into two parts, the first of which considers the operations of General Surgery, as follows: Operations upon Arteries; Veins; Lymphatic Glands and Vessels; Nerves, Plexuses and Ganglia; Bones; Joints; Muscles; Tendons and Tendon-Sheaths; Ligaments; Fascia and Bursæ; also Amputations and Disarticulations; Excisions and Osteoplastic Resections of Bones and Joints.

In the second part the operations of Special Surgery are taken up, in the following order: Spine and Spinal Cord; Neck; Thorax; Abdomino-Pelvic Region; Male Genital Organs; Female Genital Organs; and Operations for Herniæ.

The operative methods are well selected, graphically described, clearly illustrated, and cover the ground dealt with thoroughly.

The book is well constructed, and is up to date. All the subjects discussed are skillfully handled, and the work will be of value to anyone interested in operative surgery. J. S. D.

Surgery of the Upper Abdomen. In two volumes. By JOHN B. DEAVER, M. D., LL. D., Surgeon-in-Chief to the German Hospital, Philadelphia; and ASTLEY PASTON COOPER ASHHURST, M. D., Surgeon to the Out-Patient Department of the Episcopal Hospital, Philadelphia. Volume I, Surgery of the Stomach and Duodenum. With 76 illustrations, several of which are printed in colors. Volume II, in active preparation, Surgery of the Liver, Gall, Bladder, Pancreas and Spleen. (*Philadelphia: P. Blakiston's Son & Co., 1909.*)

This volume is valuable in that it brings together in a critical review all of the best work so far done on the Surgery of the Stomach and Duodenum. It also gives the results of these studies, as well as an expression of opinion based on these studies, and on the large personal experience of the authors.

The contents are as follows: Chapter I, Anatomy; II, Physiology of Digestion; III, General Diagnostic Considerations; IV-VI, Benign Diseases of the Stomach and Duodenum; VII, Hour-glass

Stomach; VIII, Benign Diseases of the Duodenum; IX, Benign Tumors of the Stomach and Duodenum; X, Miscellaneous Affections of the Stomach and Duodenum; XI, Malignant Diseases of the Stomach; XII, Malignant Diseases of the Stomach and Duodenum; XIII, Injuries of the Diaphragm, Stomach and Duodenum; XIV, Technique of Operations; XV, Complications and Sequels. Index of Names. Index.

Here and there through the book are short tables of valuable statistics, which are analyzed and discussed. There is practically no repetition in the text.

The discussion of the literature under the various headings is quite full, and the conclusions drawn are excellent. The descriptions are brief, but clear. The most important references are given after each subject.

The book is well printed, and the illustrations are satisfactory. This work will be useful to anyone interested in the surgery of the stomach and duodenum, and is well worth reading. J. S. D.

General Surgery. A presentation of the Scientific Principles upon which the Practice of Modern Surgery is Based. By EHRICH LEXER, M. D., Professor of Surgery, University of Königsberg. American edition edited by ARTHUR DEAN BEVAN, M. D., Professor and Head of the Department of Surgery, Rush Medical College, in Affiliation with the University of Chicago. An Authorized Translation of the Second German Edition, by DEAN LEWIS, M. D., Assistant Professor of Surgery, Rush Medical College, in Affiliation with the University of Chicago. With 449 illustrations in the text, partly in color, and two colored plates. (*New York and London: D. Appleton & Co., 1908.*)

The title, General Surgery, is the one in use on the continent in contradistinction to Special or Regional Surgery, and is somewhat misleading. However, the subheading fully explains the aim of the work.

The book is divided into seven parts and an idea of its scope can be obtained from the following summary:

Part I: 1, Wounds, Their Treatment and Repair; 2, Aseptic Technic; 3, General and Local Anæsthesia; 4, General Principles of Plastic Operations.

Part II, Wound Infections and Surgical Infectious Diseases: 1, Nature of Infections, Local and General Reaction; 2, Wound Infections Caused by Pyogenic and Putrefactive Bacteria and their Results; 3, Wound Infections of Different Origins and Surgical Infectious Diseases.

Part III, Necrosis.

Part IV, Injuries of Soft Tissues, Bones and Joints, and their Treatment: 1, Mechanical Injuries; 2, Chemical Injuries; 3, Thermal Injuries; 4, General Results of Injuries.

Part V, Important Surgical Diseases, Excluding Infections and Tumors.

Part VI, Tumors.

Part VII, Cysts, Not Including Cystic Tumors.

Appendix: 1, Direct Transfusion of Blood; 2, Opsonins, Phagocytosis and Therapeutic Inoculations of Dead Bacteria.

Dr. Bevan says in his preface, and very rightly, that there are certain general principles of pathology, therapeutics and operative technic which apply to all fields of Surgery, and where these are thoroughly mastered by the student or practitioner their application to special surgical conditions becomes at once intelligent, easy and scientific.

Many valuable additions to the original German edition have been made, and they materially increase the usefulness of the book.

In this volume all the subjects included in the above mentioned outline, are fully though concisely taken up. The illustrations are good, the references to the literature are plentiful and the book is well printed. It is without a doubt the most complete and up-to-date work now available in English, on the scientific principles upon which modern surgery is based, and is well worth reading.

J. S. D.

Abdominal Hernia: Its Diagnosis and Treatment. By W. B. DEGARMO, M. D., Professor Special Surgery (Hernia), N. Y. Post Graduate Medical School and Hospital, etc. (*Philadelphia: J. B. Lippincott Company, 1909.*)

This book, as its author states in his preface, is intended for the use of the general practitioner rather than the surgeon, and from this standpoint seems to fulfil in every way the purpose of the writer. The text is clear, the descriptions are good, and the illustrations are excellent and comprehensive.

The author starts with a brief but admirable description of the surgical anatomy of the various types of inguinal hernia. He devotes two-thirds of the volume to this type of hernia and covers the ground thoroughly and with a style which renders the work unusually interesting for one of its character.

The chapter devoted to the mechanical treatment of hernia is especially valuable. The different forms of trusses are here illustrated and the indications for the use of each are given. Instructions in regard to the proper fitting of such appliances and the precautions to be observed are fully set forth. The author, while he deprecates the mechanical treatment of hernia, recognizes the fact that many persons so afflicted will refuse operation, regardless of the advantages attending the more radical treatment. He is also aware that the majority of surgeons and practitioners know little or nothing about the proper fitting of a truss and in consequence turn the patient over to the instrument maker for further treatment. This division can be commended to both surgeon and physician.

The section on femoral hernia is brief, but good. Only one operation for correction is described or advocated: namely, the stitching of Poupart's ligament to the tissues overlying the ramus of the pubic bone, all these tissues being included in the four sutures necessary to close the opening.

In the cure of umbilical hernia an eliptical incision in the direction of the long axis of the body is recommended in which the umbilicus, the sac and any omentum which may be adherent are all removed in one mass, and after tying the neck of the sac the opening is closed by overlapping the abdominal wall. This manner of closing is stated to be superior to that of Dr. W. J. Mayo, who overlaps the abdominal wall in a transverse direction.

The less frequent forms of hernia receive brief mention.

The author has used original photographs and illustrations taken chiefly from his own patients while under treatment and based his conclusions as to form of treatment and operation largely upon his own personal experience with 1411 patients.

Constipation and Intestinal Obstruction. By SAMUEL G. GANT, M. D., LL. D., Professor of Diseases of the Rectum and Anus in the New York Post-Graduate Medical School and Hospital. Illustrated. Price $6.00. (*Philadelphia and London:* W. B. *Saunders Company.*)

Physicians as well as surgeons will be well repaid by a careful review of Dr. Gant's excellent book. Written in an easy style, concise and for the most part clear, the many points in diagnosis and treatment of this too neglected branch of medicine are taken up in logical order.

The indiscriminate use of enemata and drugs by both the laity and the profession is properly criticized and the necessity of cultivating regularity in evacuating the bowels could not have been better stated.

The value of the book would have been enhanced had there been added a chapter devoted exclusively to the proper examination of

the feces—macroscopic, microscopic and chemical. A more complete list of references, too, might well have been appended.

One cannot help wondering if due consideration has been given to the mental influence resulting from the use of the various mechanical devices, such as vibratory and electrical apparatus. And the same thought occurs to us on reading of the wonderful results following operative interference for constipation due to splanchnoptosis. One would hesitate to recommend this procedure for general use. The intestines can assume so many and various seemingly abnormal positions in perfectly normal individuals—especially is this true of the colon—that operative interference, except in cases selected with extreme care, can result only in additional misery. A careful study of Dr. Gant's reported cases ten years hence, might throw a great deal of light on this subject.

The author's severe condemnation of Whitehead's operation is not shared by the surgeons of all hospitals where in exaggerated cases of hemorrhoids, it is the operation of choice rather than of selection.

Many ingenious devices, both operative and mechanical, have been originated by the author and should prove of great value in this line of work.

The book is printed in a very legible type and is exceedingly well indexed. BERTRAM N. BERNHEIM.

Surgical Diseases of the Abdomen. With special reference to diagnosis. By RICHARD DOUGLAS, M. D., formerly Professor of Gynecology and Abdominal Surgery, Medical Department, Vanderbilt University, Nashville, etc. Illustrated by 20 full-page plates. Second edition, revised and enlarged, edited by RICHARD A. BARR, B. A., M. D., Professor of Abdominal Surgery, Medical Department, Vanderbilt University, etc. (*Philadelphia: P. Blakiston's Son & Co., 1909.*)

There have been very few changes made in the book since its first edition.

The text indicates great familiarity with the literature, and the bibliography is very complete up to 1903. However, there have been no additions to these lists, as the latest reference is 1902.

J. S. D.

Medical Inspection of Schools. By A. H. HOGARTH, M. B., etc. Price $2.00. (*London: Henry Frowde and Hodder & Stoughton.*) *Oxford Medical Publications.*

The recognition that children, taken over by the State for compulsory education, are often returned to their parents the worse for the experience is the real inception of modern medical inspection of schools.

Dr. Hogarth's book is an excellent presentation of what has been and ought to be done in this very important branch of State medicine.

He rightly defines medical inspection as more than an attempt to exclude contagious diseases or to point out obvious defects of the eyes, ears, nose and throat, but as a systematic overlooking of school life with regard to buildings and methods, with careful examinations of all children, normal and abnormal, sufficiently often to note defects and to devise means for correcting them when possible.

He emphasizes the fact that any system of education to be effective must be sufficiently elastic to reach alike the physically strong or weak—the mentally precocious or backward—and for results the physician and educator must work together harmoniously. The subject is considered from the point of view of the practical benefit to the community and State as well as the individual.

The book too is essentially practical, as to organization and administration—the duties and methods of the doctor and the nurse.

Brief reviews of the work done in various cities in this country and abroad are given and short descriptions of a number of common diseases affecting school life and their management.

He also describes school clinics which have been inaugurated in some cities abroad, to which children are referred by the inspectors and treated by specialists employed by the government.

While ideal, this seems hardly necessary in our cities, where excellent treatment is to be had at hospitals and dispensaries.

The book will be found useful to boards of education as well as doctors and nurses engaged in the work. R. A. U.

The Collected Papers of Joseph, Baron Lister, etc. Two volumes. (*Oxford: At the Clarendon Press.*)

These handsome volumes are a splendid memorial of the work done by Lord Lister. Here are presented all his most notable contributions, and it is such a list of important papers on various subjects as could not be equaled by any other living member of the profession. Here are his papers on Antisepsis, which will ever be associated with his name, and make it memorable as that of one of the great medical men of all times. There are other valuable articles on physiological, pathological and surgical subjects.

All that Lord Lister has written is well worth reading and it is to be regretted that these volumes are too costly for many who would be glad to own them. It would seem as though a cheap reprint would be most welcome.

Report to the Government of British Honduras upon the Outbreak of Yellow Fever in that Colony in 1905. By RUBERT BOYCE, M. B., F. R. S. (*London: Printed by Waterlow & Sons, Limited, 1906.*)

This report is well prepared and written, and will prove of interest to health officers and physicians living in our southern cities and throughout Central America, where outbreaks of yellow fever will still continue to occur from time to time. Dr. Boyce has made a thorough study of the problems associated with the existence of this fever in the town of Belize (Honduras) and the problems, and their solutions, are similar to those existing wherever yellow fever is found, and it is only by reiteration of well-known facts that the disease will be controlled more and more. The report is deserving of attention, especially as dealing with conditions in a small town where the doctors did not recognize the first cases.

The Faith and Works of Christian Science. By the writer of "Confessio Medici." (*New York: The Macmillan Company, 1909.*)

It is no secret that Dr. Stephen Paget, of London, is the author of the "Confessio Medici," a work that received much praise on its appearance and undoubtedly this attack on "Christian Science," as practiced by some of its followers, will have a warm reception. The author has studied both the Faith and Works carefully, and like many others finds little that is intelligible in the Faith, as expressed in Mrs. Eddy's works, and in the Works discovers far more harm than good. On the faithful followers of Mrs. Eddy this work will leave no impression—they will not waste their energies in refuting the attack—and to those who are already opposed to the Faith and its Works this new exhibition of its weakness and wickedness will appear unnecessary. Ridicule alone will kill this "new" religion—and no one as yet has appeared competent for the task. Every new serious study of Christian Science probably brings more adherents to the Faith than it takes away members. The less attention paid to it the better, or laugh at it, and sooner or later it will die a natural death. People will put up with any insult rather than lack of attention or ridicule. It is to be feared that Christian Science will outlive this last attack on its stronghold, and that Dr. Paget's good object will have little or no result.

BOOKS RECEIVED.

A System of Operative Surgery. By Various Authors. Edited by F. F. Burghard, M. S. (Lond.), F. R. C. S. (Eng.). In four volumes. Vol. IV: Operations upon the Female Genital Organs, Ophthalmic Operations, Operations upon the Ear, Operations upon the Larynx and Trachea, Operations upon the Nose and its Accessory Cavities. 1909. 8vo. 687 pages. Oxford Medical Publications. Henry Frowde, London; Hodder & Stoughton, London.

Studies in Paranoia. Periodic Paranoia and the Origin of Paranoid Delusions, by Dr. Nikolaus Gierlich, Wiesbaden. Contributions to the Study of Paranoia, by Dr. M. Friedmann, Mannheim. Translated and edited by Smith Ely Jelliffe, M. D. 1908. 8vo. 78 pages. The Journal of Nervous and Mental Disease Publishing Company, New York.

The Malarial Fevers, Hæmoglobinuric Fever and the Blood Protozoa of Man. By Charles F. Craig, M. D. Illustrated by four colored plates, twenty-five clinical charts and twenty-eight photomicrographs and drawings. 1909. 8vo. 477 pages. William Wood & Co., New York.

Third Report of the Welcome Research Laboratories at the Gordon Memorial College, Khartoum. Andrew Balfour, M. D., B. Sc., F. R. C. P. (Edin.), D. P. H. Camb., Director. 1908. 4to. 477 pages. Published for Department of Education, Sudan Government, Khartoum, by Baillière, Tindall & Cox, London.

The Collected Papers of Joseph Baron Lister, Member of the Order of Merit, Fellow and Sometime President of the Royal Society, Knight Grand Cross of the Danish Order of the Danebrog, etc. In two volumes. 1909. 4to. At the Clarendon Press, Oxford.

Metropolitan Asylums Board. Annual Report for the Year 1908. (11th year of issue.) 1909. 8vo. 302 pages. Charles Straker & Sons, Limited, London.

Report on Plague in the Gold Coast in 1908. By W. J. Simpson, M. D., C. M. G., etc., 1909. Fol. 55 pages. J. & A. Churchill, London.

Text-Book of Hygiene. A Comprehensive Treatise on the Principles and Practice of Preventive Medicine from an American Standpoint. By George H. Rohé, M. D., and Albert Robin, M. D. Fourth revised and enlarged edition. With many illustrations and valuable tables. 1908. 8vo. 582 pages. F. A. Davis Company, Philadelphia.

Naval Hygiene. By James Duncan Gatewood, M. D. Prepared by Direction of the Bureau of Medicine and Surgery, and Published by Permission of the Navy Department. With eight colored plates and 105 other illustrations. 1909. 8vo. 779 pages. P. Blakiston's Son & Co., Philadelphia.

Immunity and Specific Therapy. By W. D'Este Emery, M. D., B. Sc. (Lond.). With illustrations. 1909. 8vo. 448 pages. Paul B. Hoeber, New York.

Neurasthenia. By Gilbert Ballet. Translated from the third French edition by P. Campbell Smith, M. D. Illustrated with seven figures. 1909. 8vo. 408 pages. Paul B. Hoeber, New York.

The Sexual Disabilities of Man and their Treatment. By Arthur Cooper. 1909. 16mo. 148 pages. Paul B. Hoeber, New York.

The Open-Air Treatment of Pulmonary Tuberculosis. By F. W. Burton-Fanning, M. D. (Cantab.), F. R. C. P. (Lond.). Second edition. 1909. 12mo. 184 pages. Paul B. Hoeber, New York.

Protozoölogy. By Gary N. Calkins, Ph. D. Illustrated with 125 engravings and 4 colored plates. 1909. 8vo. 349 pages. Lea & Febiger, New York and Philadelphia.

Sprains and Allied Injuries of Joints. By R. H. Anglin Whitelocke, M. D., M. C. (Edin.), F. R. C. S. (Eng.). 1909. 8vo. 241 pages. Oxford Medical Publications. Henry Frowde, London. Hodder & Stoughton, London.

The Principles of Bacteriology. By A. C. Abbott, M. D. Eighth edition, thoroughly revised. With 100 illustrations, 26 of which are colored. 1909. 12mo. 631 pages. Lea & Febiger, Philadelphia and New York.

Manual of Chemistry. A Guide to Lectures and Laboratory Work for Beginners in Chemistry. A Text-Book Specially Adapted for Students of Medicine, Pharmacy and Dentistry. By W. Simon, Ph. D., M. D., and Daniel Base, Ph. D. Ninth edition, thoroughly revised. With seventy-eight illustrations, one colored spectra plate and eight colored plates representing sixty-four chemical reactions. 1909. 8vo. 716 pages. Lea & Febiger, Philadelphia and New York.

American Practice of Surgery. A Complete System of the Science and Art of Surgery, by Representative Surgeons of the United States and Canada. Editors: Joseph D. Bryant, M. D., LL. D. Albert H. Buck, M. D. Volume Six. Profusely illustrated. 1909. 4to. 916 pages. William Wood & Co., New York.

The Harvey Lectures. Delivered under the Auspices of the Harvey Society of New York, 1907-1908. By Professors Edwin O. Jordan, James Ewing and others. 1909. 8vo. 266 pages. J. B. Lippincott Company, Philadelphia.

Tuberculosis. A Treatise by American Authors on its Etiology, Pathology, Frequency, Semeiology, Diagnosis, Prognosis, Prevention and Treatment. Edited by Arnold C. Klebs, M. D. With three colored plates and two hundred and forty-three illustrations in text. 1909. 8vo. 939 pages. D. Appleton & Co., New York and London.

Practical Dietetics. With Special Reference to Diet in Disease. By W. Gilman Thompson, M. D. Fourth edition, illustrated, enlarged and completely rewritten. 1909. 8vo. 928 pages. D. Appleton & Co., New York and London.

THE JOHNS HOPKINS HOSPITAL BULLETIN.

The Hospital Bulletin contains details of hospital and dispensary practice, abstracts of papers read, and other proceedings of the Medical Society of the Hospital, reports of lectures, and other matters of general interest in connection with the work of the Hospital. It is issued monthly.

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